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MBA PROFESSIONAL REPORT

**An Analysis of the Efficiency of Sourcing
Knowledge-based Services in the United
States Air Force**

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June 2013**

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SERVICES IN THE UNITED STATES AIR FORCE**

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ABSTRACT

The purpose of this study is to explore whether and how the United States Air Force (USAF) can improve efficiency in sourcing knowledge-based services by instituting for-profit sector best practices in strategic sourcing. Knowledge-based services are a major part of the total services acquired by the Department of Defense (DoD); however, the DoD is currently unable to determine how much savings can be attained in this area. Despite evolving DoD policies, there is currently no cost-saving/avoidance framework or set of best practices for knowledge-based service contracts. In this study, we interviewed procurement professionals from the for-profit and not-for-profit sectors, analyzed USAF knowledge-based service contracts, and conducted a spend analysis on the USAF FY2010 spend data to identify for-profit best practices to aid the USAF in realizing cost savings when purchasing knowledge-based services. The findings of this research suggest that the USAF is currently not utilizing the for-profit best practices to their fullest potential. This study provides recommendations for the USAF and DoD to realize additional cost savings in the purchasing of knowledge-based services. Additionally, the research serves as a pilot for future study on identifying for-profit sector best practices in the sourcing of knowledge-based services.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABC	Activity-Based Costing
AFSOC	Air Force Special Operations Command
ARP	Acquisition Research Program
AT&L	Acquisition Technology and Logistics
BPA	Blanket Purchase Agreement
CALL	Center for Army Lessons Learned
CAPS	Center for Advanced Procurement and Supply
CICA	Competition In Contracting Act
CLIN	Contract Line Item Number
CNG	Commission for a New Georgia
COR	Contracting Officer Representative
CPARS	Contractor Performance Assessment Reporting System
CPFF	Cost-Plus Fixed Fee
CSIS	Center for Strategic and International Studies
DAMIR	Defense Acquisition Management Information Retrieval
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DCAA	Defense Contracting Audit Agency
DCMA	Defense Contract Management Agency
DO	Delivery Order
DoD	Department of Defense
DPAP	Defense Procurement and Acquisition Policy
EDA	Electronic Document Access

eRA	Electronic Reverse Auctioning
FAR	Federal Acquisition Regulation
FBO	Federal Business Opportunities
FFP	Firm-Fixed Price
FPDS-NG	Federal Procurement Data System
FSSI	Federal Services Sourcing Initiative
GAO	Government Accountability Office
GSA	General Services Administration
KBS	Knowledge-Based Services
KM	Knowledge Management
IDIQ	Indefinite Delivery Indefinite Quantity
IPPD	Integrated Product and Process Development
IRB	Institution Review Board
ISM	Institute of Supply Management
IT	Information Technology
LH	Labor Hour
NPS	Naval Postgraduate School
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
PAMS	Professional And Management Services
PASS	Program Acquisition and Strategic Sourcing
PWS	Performance Work Statement
PSC	Product Service Code
RFI	Request for Information
RFP	Request for Proposal

RFQ	Request for Quote
RFS	Request for Solutions
RQ	Research Question
R&D	Research and Development
SOO	Statement of Objectives
SOP	Standard Operating Procedures
SOW	Statement of Work
SSIP	Superior Supplier Incentive Program
SSS	Superior Supplier Status
TCO	Total Cost of Ownership
TINA	Truth In Negotiation Act
T&M	Time and Material
USAF	United States Air Force

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I. INTRODUCTION

A. BACKGROUND

The United States Department of Defense (DoD) is facing a new government-wide mandate for cost savings due to looming sequestration, increased public scrutiny, and a worldwide economic crunch. A 2006 Government Accountability Office (GAO) report stated that the DoD, as the largest buyer of services in the federal government, “must maximize its return on investment and provide the warfighter with needed capabilities and support at the best value for the taxpayer” (p. 1). Additionally, one of the fundamental premises of the Federal Acquisition Regulations (FAR) system is the efficient use of public resources (FAR, 2013a). These premises create a challenge for the acquisition workforce within the DoD to sustain quality supplies and services with an additional focus on mitigating cost.

A benchmarking research survey showed that purchasing services is more difficult than purchasing goods (Ellram, Tate, & Billington, 2007). In service contracts, it is difficult to define the service level required and to write precise statements of work, whereas it is relatively easy to write specifications for manufactured goods (Ellram et al., 2007). There is a general belief that service quality and performance are not as easy to measure and specify objectively as product quality and performance due to a service’s intangibility, heterogeneity, perishability, and inseparability (Ellram et al., 2007). Because the trend of purchasing services is on the rise, there are opportunities for organizations to improve their purchasing of services (Ellram et al., 2007). However, the requisite infrastructure in terms of processes and human resources involved in service purchasing is not commensurate with the growth of service purchasing (Ellram et al., 2007).

The DoD, like all other organizations, has focused primarily on the cost savings in acquiring supplies by using strategic sourcing processes (see Figure

1; Defense Procurement and Acquisition Policy [DPAP], 2005). According to the Office of Management and Budget (OMB; 2005), “strategic sourcing is the collaborative and structured process of critically analyzing an organization’s spending and using this information to make business decisions about acquiring commodities and services more effectively and efficiently” (p. 1). One for-profit sector firm defined *strategic sourcing* as “the process of evaluating, selecting, and aligning suppliers or consortiums of suppliers to achieve operational improvements in support of an organization’s strategic goals” (Duffie & Koester, 2005, p. 3). The for-profit sector offers multiple definitions of *strategic sourcing*, depending on the strategies used for that respective corporation. Despite these multiple definitions, both the for-profit and not-for-profit sectors focus first on spend analysis and then leverage a respective area that will help to cut costs while still providing quality products and services.

Although the for-profit sector has recognized the benefits of strategic sourcing as far back as the 1970s, the DoD continues to struggle with implementing its own agency-wide framework for strategic sourcing (GAO, 2012c). The GAO released a study in 2002 conducted on six leading companies that had instituted a strategic approach to the acquisition of services. Brunswick, Dun & Bradstreet, Electronic Data Systems, ExxonMobil, Hasbro, and Merrill Lynch & Company successfully reengineered their business practices for acquiring services (General Accounting Office [GAO], 2002). As a result, the organizations netted cost savings as high as 15% while maintaining or even improving service levels (GAO, 2002).

The DoD has also implemented a small number of commodity councils for sourcing goods strategically; however, the DoD is finding it difficult to strategically source services due to their varying nature (Weigelt, 2012). Over the past few decades, the DoD has focused on promoting efficiencies in the acquisition of products but is now looking at gaining efficiencies in service contracts as well, because more than half of all contract spending involves services. A variety of factors contributes to the relative neglect of purchasing professionally managed

services (Ellram et al., 2007). These factors include a lack of resources and information technology, lack of support-improved service purchasing, and a lack of understanding of cost structure and when to outsource (Ellram et al., 2007). Moreover, due to the peculiar nature of services, it is difficult to develop service specifications, evaluate services in advance, and quantify services in cost; hence, it is difficult to put a price on services (van der Valk & Rozemeijer, 2009). Coupled with fragmented service spending and a growing service supply base, the results of poor service purchasing management can have harmful effects on the organization's performance (Ellram et al., 2007).

Many companies buy services indiscriminately because they consider these services to be non-strategic (van der Valk & Rozemeijer, 2009). Even if a company were to regard a service as critical or strategic in nature, non-procurement people, such as marketers and logisticians, are still involved in the service's procurement (van der Valk & Rozemeijer, 2009). A study of 158 companies showed that purchasing departments were involved in only 41% of service purchases, which highlights the neglect of realizing the complexity of purchasing services (Bales & Fearon, 1995).



Figure 1. DoD-Wide Strategic Sourcing Program *Concept of Operations*
(From DPAP, 2005)

A 2009 GAO report showed that DoD obligations for service contracts doubled between fiscal year (FY) 2001 and FY2008, from \$92 billion to \$200 billion (see Figure 2). However, GAO is very critical about DoD's management of services acquisition. According to a 2007 report, "the DoD does not know how well its service acquisition processes are working ... and whether it is obtaining

the services that it needs while protecting the DoD's and the taxpayer's interests" (2007a, p. 1). Additionally, GAO also criticized DoD for the lack of key elements at the strategic and transactional levels in managing its processes for administering service acquisitions (2007b).

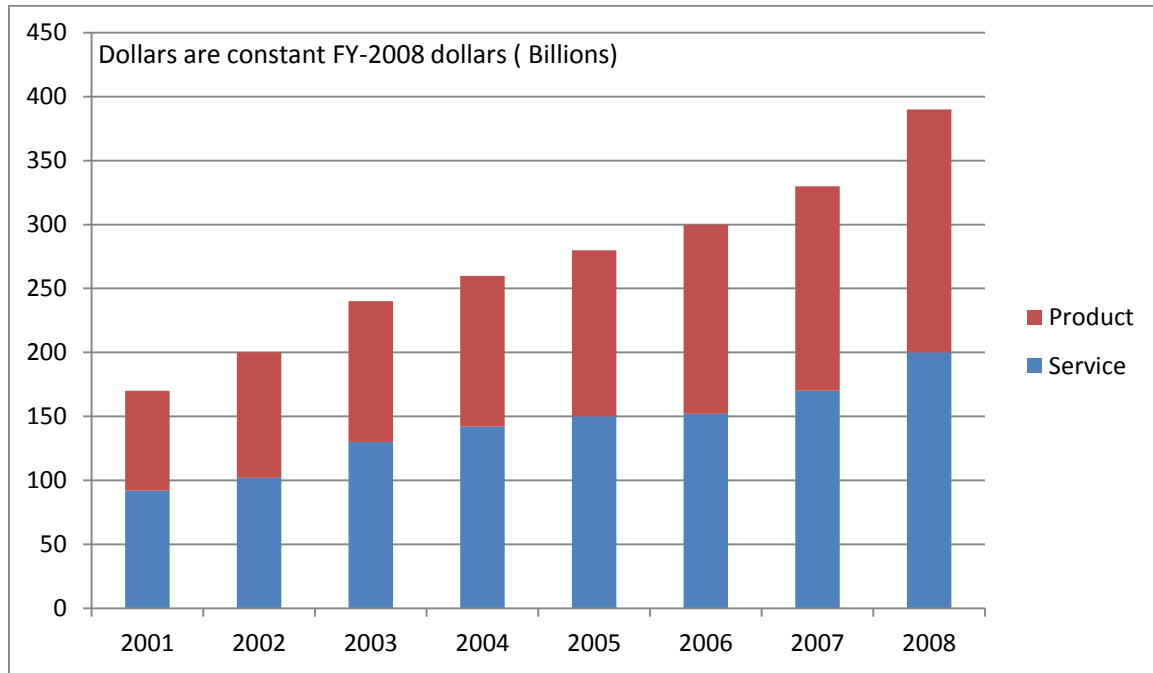


Figure 2. Increase in Obligation Toward Service Contract (After GAO, 2009b)

The increased reliance on service contracts amplified the risk of hiring contractors to fill inherently governmental functions (GAO, 2011b). As per FAR 2.1 (2013b), "inherently governmental functions means, as a matter of policy, a function that is so intimately related to public interest as to mandate performance by Government employees." Examples of inherently governmental functions in contracting include contract awards, contract administration, contract termination, and participation of a contractor as a voting member on a source selection board (FAR, 2013b). When the government hires contractors to fill inherently governmental services, it places contractors in a position to inappropriately influence decisions on government authority, control, and accountability (GAO, 2011b). A shrinking acquisition workforce and increased spending on services exacerbate this problem (GAO, 2007b). According to a 2007 GAO report, the

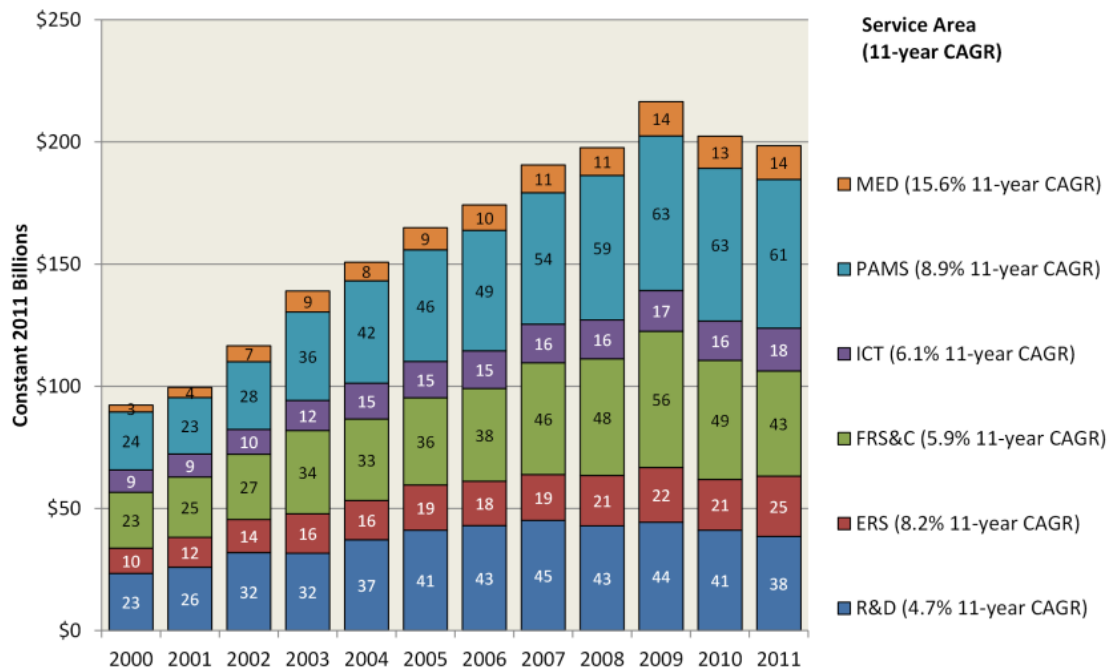
“Inspectors General ... identified numerous instances of weak business practices—poorly defined requirements, inadequate competition, insufficient guidance and leadership, inadequate monitoring of contractor performance, and inappropriate uses of other agencies’ contracts and contracting services” (2007b, p. 2).

Since the economic crisis in 2008–2009, firms seeking to transform their sourcing strategies often have limited resources (Monczka & Petersen, 2011). It is during the slow economic recovery that firms must be ever vigilant in finding efficiencies in strategic sourcing. Monczka and Petersen (2011) claimed that firms must set clear goals, lock in resources, set transformation priorities, and then follow through with the transformation. The continuing economic crunch and the engagement of U.S. military personnel in Iraq and Afghanistan forced the DoD to begin a comprehensive effort to increase efficiencies, reduce overhead costs, and eliminate redundant functions in order to improve the effectiveness of the DoD enterprise. This effort focused on reprioritizing how the DoD can use resources to more effectively support and sustain the force and, more importantly, the warfighter (DoD, 2010). Based on Defense Secretary Robert M. Gates’ initiatives of efficiency improvement in the Pentagon, then–Under Secretary of Defense for Acquisitions, Technology, and Logistics (USD[AT&L]) Ashton Carter (Office of the Under Secretary of Defense [OUSD], 2010a) unveiled the memorandum *Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending* to acquisition professionals. The objective of the memorandum was “to deliver war fighting capabilities needed within the constraints of declining defense budget by achieving better buying power for the warfighter and the tax payer” (DoD, 2013). In the memorandum, Carter wrote:

We have a continuing responsibility to procure the critical goods and services our forces need in the years ahead, but we will not have ever-increasing budgets to pay for them. We must therefore strive to achieve what economists call productivity growth; in simple terms, to DO MORE WITHOUT MORE. (OUSD, 2010a)

Subsequently, Frank Kendall, the new USD(AT&L), issued *Better Buying Power 2.0: Continuing the Pursuit for Greater Efficiency and Productivity in Defense Spending* (Kendall, 2012). Kendall (2012) stressed “improved tradecraft in acquisition of services” as one of the seven major categories of initiatives under the Better Buying Power 2.0. Kendall (n.d.), during his speech at the Center for Strategic and International Studies (CSIS), stated that there are great opportunities for efficiencies in the acquisition of services because the DoD is spending more than half of its budget on services. Kendall (n.d.) also mentioned that all six basic types of services (i.e., knowledge-based services, facilities-related services, medical services, equipment-related services, electronic and communication services, and transportation services) have their own peculiar characteristics and best practices to achieve efficiencies.

Although knowledge-based services are only one of the six types of services, they account for a major portion of service spending and provide a substantial opportunity for cost savings. This is evident from the fact that DoD spending on knowledge-based services is steadily increasing. Between FY2005 and FY2011, the DoD increased the use of knowledge-based services from \$28.3 billion to \$45.2 billion (DPAP, 2012; GAO, 2007a). Knowledge-based services constitute a vast portion within professional and management services (PAMS), as categorized by the CSIS (Berteau, Ben-Ari, Sanders, Morrow, & Ellman, 2012). As shown in Figure 3, spending on professional and management services also increased from \$24 billion in 2000 to \$61 billion in 2011, which equates to a growth of 8.9% per year (Berteau et al., 2012). Figure 3 also shows that from 2003 to 2011, the DoD spent more dollars on professional and management services than on any other category (Berteau et al., 2012). The United States Air Force (USAF) spend data of FY2010 also showed an obligation of \$9.7 billion on knowledge-based services, which is 37.82% of total spending on acquisition of services (Federal Procurement Data System–Next Generation [FPDS–NG], 2010).



Source: FPDS; analysis by CSIS Defense-Industrial Initiatives Group

Figure 3. Defense Service Contract Spending by Service Area based on Compound Annual Growth Rate (CAGR) (From Berteau et al., 2012)

During this time of financial constraints, the DoD must use the obligated dollars in the most efficient manner. Due to the peculiar characteristics of the services, the DoD is unable to quantify the output of services in terms of their contribution to the overall mission. Knowledge-based services are a major part of the total services acquired by the DoD; however, the DoD is currently unable to determine how much savings can be attained in this area. Despite evolving DoD policies, there is currently no cost-saving/avoidance framework or set of best practices for knowledge-based service contracts.

B. RESEARCH OBJECTIVES

The purpose of this research is to explore whether and how the USAF can improve efficiency in sourcing knowledge-based services by instituting commercial best practices in strategic sourcing.

C. RESEARCH QUESTIONS

In this research, we attempt to answer the following questions:

1. What are the relevant tenets of strategic sourcing?
2. What are commercial best practices in sourcing knowledge-based services?
3. What are the constraints, if any, of applying the commercial best practices in the USAF context?
4. What are the different types of knowledge-based services being procured? How much money is spent on these services, with how many different contractors, from how many different buying offices, and through how many different contract actions? How many are with small businesses? How many are sole source? What is the composition by contract type?
5. What are the different outcomes/deliverables of contracted knowledge-based services (e.g., technical reports, research, staff support labor, education, training, analysis, advice, briefings, white papers)?
6. Of the different outcomes of knowledge-based services, what are the major cost drivers (e.g., time, labor rates, skills, travel) of each by type? How are costs minimized?
7. Can those cost drivers be better managed to increase efficiency without compromising effectiveness? If so, how?
8. By applying commercial best practices and original ideas, how much cost could be saved or avoided?

D. BENEFITS OF RESEARCH

The overall intent of this research is to improve the efficiency of sourcing knowledge-based services within the USAF. The literature review and data analysis in this research will help in understanding and analyzing the best

practices that the USAF can adopt in sourcing knowledge-based services in the most cost-effective and efficient manner. Based on our findings, we can provide recommendations that could potentially improve the sourcing of knowledge-based services in the USAF. This study also establishes a framework for future studies across all other components of the DoD.

E. LIMITATIONS OF RESEARCH

The sample size we used in the spend analysis is only a small percentage of knowledge-based services being acquired by the USAF in terms of the categories of services and the number of contracts; therefore, there may be some cost drivers and inefficiencies that remain unexplored. Moreover, there are for-profit sector best practices that the DoD cannot implement due to government regulations and statutory requirements.

F. ORGANIZATION OF REPORT

There are five chapters in the report. Chapter I includes background information, the purpose and objectives of the study, research questions, benefits and limitations, and the research methodology. Chapter II includes the literature review related to academic theories of knowledge management and knowledge flow, strategic sourcing, and the DoD's application of strategic sourcing. In Chapter III, we discuss the methodology used for the collection of the data. Chapter IV is the analysis of the quantitative and qualitative data. Finally, in Chapter V, we offer conclusions, recommendations, limitations of the study, and future research directions.

G. METHODOLOGY

The research methodology includes a spend analysis of USAF knowledge-based service contracts for FY2010 as well as an analysis of the latest for-profit sector best practices for sourcing services. Based on a literature review and an analysis of spend data, we formulated a questionnaire to gather information to aid in answering the research questions. We analyzed data

qualitatively and quantitatively to draw conclusions about inefficiencies in the USAFs sourcing of knowledge-based services. We developed research objectives to identify the ways by which the USAF can improve its efficiency of sourcing knowledge-based services by instituting for-profit sector best practices and tenets of strategic sourcing. To achieve our research objectives systematically, we approached the research in the following manner:

1. identify knowledge-based services through spend analysis;
2. identify best practices for sourcing knowledge-based services in the corporate and government sectors; and
3. provide recommendations on sourcing procedures of knowledge-based services in the USAF.

II. LITERATURE REVIEW

A. CHAPTER OVERVIEW

The purpose of this chapter is to analyze the literature on relevant topics pertaining to the strategic sourcing of services. This chapter begins by highlighting the characteristics of services, workforce issues, and inherently governmental functions as they relate to services, followed by an overview of knowledge-based services. This chapter concludes by describing knowledge management theories and the basic history, tenets, and current DoD initiatives of strategic sourcing.

B. SERVICES

Between FY2005 and FY2011, the DoD increased the use of knowledge-based services from \$28.3 billion to \$45.2 billion (DPAP, 2012; GAO, 2007a). This increased reliance on service contracts has amplified the risk of hiring contractors to fill inherently governmental services (GAO, 2011b). When the government hires contractors to fill inherently governmental services, it places contractors in a position to inappropriately influence decisions on government authority, control, and accountability (GAO, 2011b). A lack of management oversight due to increased acquisition spending and a reduction in the size of the acquisition workforce compounded this risk (GAO, 2007b). Despite evolving DoD policies, there is currently no approved cost-saving/avoidance framework or set of best practices that can be applied to sourcing knowledge-based services.

1. Characteristics

Services and commodities both aim to meet a need, provide functionality and value for the customer, and vie for a place in the competitive market (Axelsson & Wynstra, 2002). Services are often difficult to define, but most definitions tend to include the properties of intangibility and simultaneous consumption (Fitzsimmons & Fitzsimmons, 2008). Lovelock and Wirtz (2007) defined *services* as

economic activities offered by one party to another, most commonly employing time-based performances to bring about desired results in recipients themselves or in objects or other assets for which purchasers have responsibility. In exchange for their money, time, and effort, service customers expect to obtain value from access to goods, labor, professional skills, facilities, networks, and systems; but they do not normally take ownership of any of the physical elements involved. (p. 15)

Services require some degree of customer participation; suppliers and customers consume them simultaneously; and they are perishable, intangible, and often classified as heterogeneous (Fitzsimmons & Fitzsimmons, 2008). Because services differ by such things as complexity, duration, location, and price, they often make it difficult for suppliers to understand the market. Lovelock and Wirtz (2007) discussed eight characteristic that suppliers face:

- Most service products cannot be inventoried.
- Intangible elements usually dominate value creation.
- Services are often difficult to visualize and understand.
- Customers may be involved in co-production.
- People may be part of the service experience.
- Operational inputs and outputs tend to vary more widely.
- The time factor often assumes great importance.
- Distribution may take place through nonphysical channels.

Unlike commodities, services cannot be stored unless previously recorded electronically or physically for later use (Lovelock & Wirtz, 2007). Like unused manufacturing space waiting to produce commodities, services may also have unused capacity (e.g., facilities, equipment, labor) in anticipation for services not rendered (Lovelock & Wirtz, 2007). Every time the USAF sends an empty C5, C130, or C17 cargo plane in and out of Afghanistan, it experiences lost opportunities to retrograde unneeded or broken equipment. Over- or underutilization of capacity is very challenging for managers due to customer variations that offer no inventory to absorb these lost opportunities (Fitzsimmons & Fitzsimmons, 2008). This unused capacity causes loss of time and money. Likewise, overcapacity can forgo profit.

Customers also face the intangibility issue because they cannot see the service that they are purchasing. These behind-the-scene processes, internet-based transactions, and service personnel attitudes and expertise make it difficult for customers to see where the greatest value or performance lies (Lovelock & Wirtz, 2007). There are also services that contain both intangible services and commodities, like a mechanic who rebuilds parts for resale. Lovelock and Wirtz (2007) presented an economic model that places these types of services into the service category if more than half of the value comes from intangible services.

Another issue with services is that they are not always easy to envision and comprehend. Often, first-time customers lack the knowledge or insight to anticipate the outcome of the service—such as the USAF contracting with a major company to provide wing and fuselage testing of aircraft—thus making it difficult to trust the provider (Lovelock & Wirtz, 2007). The customer must rely on the provider's brand name or on reviews from repeat customers to make an informed decision. Service providers must work hard to build trust with the customer prior to executing the service and then follow up after completing the service to build customer confidence (Lovelock & Wirtz, 2007).

Many customers co-produce the service process every day and do not even realize it. Military personnel participate in such things as providing food services at a dining facility, meeting with consultants to discuss cost-savings measures, or applying themselves in their education (Fitzsimmons & Fitzsimmons, 2008). Likewise, many businesses are eliminating the customer from the service process, such as banks who encourage the use of online banking, businesses that encourage online shopping instead of actually going to the physical location, or the military, which allows personnel to conduct self-service moves to another geographic location and file travel claims online (Fitzsimmons & Fitzsimmons, 2008). Service providers must continually gather feedback from customers to determine whether customers value self-serve technologies (Lovelock & Wirtz, 2007). Customers who are actively involved in the service process can help the service provider make better-informed decisions.

Additionally, employees who are part of the service provided play an important role in securing future business for the service provider. Customers value the employees by their attire, availability, attitude, and interpersonal skills (Lovelock & Wirtz, 2007). Customers expect fair treatment, and businesses can ensure that this happens by properly training employees on how to provide the service. It is vital for management to keep their employees happy so that, in turn, the employees can make the customer happy. Service providers must also keep in mind that other customers can also influence future opportunities, so they must control the mixture of customers that they have in their facility at one time (Lovelock & Wirtz, 2007).

Because service providers outsource various aspects of a service, it is important for service providers to ensure that they maintain a good relationship with the supplier (Lovelock & Wirtz, 2007). Outsourcing does not allow managers to monitor every service they provide, so they must rely on customer feedback to ensure employee compliance (Fitzsimmons & Fitzsimmons, 2008). Additionally, many service providers use standardized procedures and rigorous service management procedures and provide additional employee training for service recovery procedures to combat service quality problems (Lovelock & Wirtz, 2007).

In today's busy world, customers look for services that fit their schedules. Because most people work during the day, many service providers have adjusted their hours (often 24/7) to meet customer demands (Lovelock & Wirtz, 2007). Additionally, because time is precious, customers also value the amount of time between their request for service and the time that the provider completes the service (Lovelock & Wirtz, 2007). Unlike commodities, services operate in an open system, meaning that they rely totally on the customer wait time instead of on physical inventory (Fitzsimmons & Fitzsimmons, 2008). Suppliers must balance customer wait time against service capacity, utilization, and idle time (Fitzsimmons & Fitzsimmons, 2008).

Finally, the Internet creates instant or supplementary services (Lovelock & Wirtz, 2007). Services such as the sale of insurance or education delivered online constitute instant services, whereas services such as the online purchasing of commodities or airline tickets are supplemental services to the actual outcome of receiving the goods or traveling in the airplane (Lovelock & Wirtz, 2007). Service providers must continually gather feedback from customers to determine whether customers value self-serve technologies (Lovelock & Wirtz, 2007).

Although these many challenges of services may seem trivial to the customer, they have the potential to generate cost savings for the supplier if marketed appropriately. Suppliers can pass this gained efficiency on to the customer by providing a better service or a more quality product. This gained efficiency can only be the result of properly managing the service process.

2. Inherently Governmental Functions

The increased use of contractors to provide services for the government has amplified the risk of hiring personnel to fill inherently governmental positions. When the government hires contractors to fill inherently governmental services, it places contractors in a position to inappropriately influence decisions on government authority, control, and accountability (GAO, 2011b). In 2008, Congress mandated that the DoD conduct an annual review and document all contractors related to service contracts (GAO, 2012b). The Army developed a database to conduct the inventory and was the first department to comply with the reporting requirement. Despite Congress mandating changes to the reporting requirements, the DoD indicated that it would not have an enterprise-wide system until 2016 (GAO, 2012b). According to the GAO (2012b), in 2009, the Army and the USAF had a combined 2,026 violations of contractors performing inherently governmental functions. The same report indicated that eight of 12 sample contracts reviewed by the GAO were still in violation of the congressional mandate (GAO, 2012b). The GAO attributed these poor results to

unclear lines of accountability and responsibility for conducting contractor reviews, as well as not addressing contracts where contractors were performing inherently governmental functions (GAO, 2012b). The Army also voiced its concerns about the DoD's freeze on hiring DoD civilians to replace those contractors who are filling inherently governmental positions at the 2010 levels as another deterrent to replace contractors currently filling positions (GAO, 2012b).

FAR 2.101 defines *inherently governmental functions* as the following:

Inherently governmental function"means, as a matter of policy, a function that is so intimately related to the public interest as to mandate performance by Government employees. This definition is a policy determination, not a legal determination. An inherently governmental function includes activities that require either the exercise of discretion in applying Government authority, or the making of value judgments in making decisions for the Government. (FAR, 2012a)

In addition, FAR 7.503 (2012c) lists multiple examples of inherently and non-inherently governmental functions to aid the departments in determining whether a contractor is performing an inherently governmental function. Additionally, FAR 37.114 provides further parameters to ensure that contractors do not fill inherently governmental positions (FAR, 2012a). The GAO recommended that the DoD implement clear guidance on the reporting process and address personnel currently filling inherently governmental positions (GAO, 2012b). It also recommended that the DoD set target dates for their departments to monitor compliance in reporting requirements, as well as to ensure that the Army and the USAF remove contractors currently filling inherently governmental positions (GAO, 2012b).

3. Workforce Issues

In 1990, Congress enacted the Defense Acquisition Workforce Improvement Act (DAWIA) under Public Law 101-510 to improve the acquisition workforce (Defense Acquisition University [DAU], n.d.-a). This act required that the DAU provide training for the DoD and gave the DoD leadership authority to

elect acquisition positions, set qualification standards, and create training and certification policies to train its acquisition workforce (GAO, 2011a). In 1992, the Defense Authorization Act set out to create the Acquisition Corps and enhance the acquisition workforce through education, training, and work experience (DAU, n.d.-a.). The DoD modified the DAWIA numerous times to stay relevant with the changing processes and spending trends. The DAWIA is the foundation and guide for all DoD acquisition workforce training and certification. Despite Congress' vision for a trained workforce, severe downsizing at the end of the Cold War occurred, and the DoD lost institutional knowledge.

In 2001, the defense acquisition workforce decreased by about half the post–Cold War levels; however, the contracting workload increased by 12% (GAO, 2001a). This decline in human resources, compounded by the increased use of service contracts and complex contracts, put agencies at risk for not having the right people with appropriate skills to manage these purchases (GAO, 2001b). The downsizing of the acquisition workforce eliminated much of the requisite knowledge of the market, industry trends, the ability to prepare clear statements of work (SOWs), technical abilities, and the capacity to manage contracts (GAO, 2006). Additional stress on the acquisition workforce resulted from increased security measures required after 9/11, as well as the increased use of service contracts in Afghanistan and Iraq (GAO, 2006). The DoD acknowledged its shortfalls and created a two-year plan to address the unbalanced and inexperienced acquisition workforce (GAO, 2006). The plan outlined an acquisition workforce competency model, generated policy changes on the management of contractors supporting contingency operations, and developed an integrated assessment of how to acquire services (GAO, 2007b).

In 2010, the GAO assessed the proficiency of the DoD's training and certification program and found that its program adequately provided effective training with room for improvement (GAO, 2011a). Despite the adequate training program, the GAO recommended that the DoD develop a means of continuously tracking the strength and skills of the acquisition workforce (GAO, 2011a). The

GAO also recommended that the DoD establish a means of identifying acquisition-related personnel who require DAWIA training due to their involvement in the procurement process (GAO, 2011a).

4. Knowledge-based Services

The DoD currently spends more on knowledge-based services than on major weapons systems (Sablan, 2011). Despite the increased use of knowledge-based service contracts in the last decade, the DoD has done little to address inefficiencies in the procurement of knowledge-based services. The for-profit sector also increased its spending on “talented (and highly paid) engineers, salespeople, scientists, and other professionals” (Dewhurst, Ellsworth, & Hancock, 2013, p. 60). The increased use of knowledge-based services is causing a shortage of knowledge workers. Research conducted by McKinsey Global Institute predicted a shortage of 13% of demand by 2020 (Dewhurst et al., 2013). If the predicted shortage of knowledge-based workers is true, then the DoD will also face sourcing issues.

Knowledge-based services within the DoD are defined by the DAU as “sources to support or improve organizational policy development, decision-making, management and administration, program and/or project management and administration, or research and development (R&D) activities” (DAU, n.d.-b). The DoD further broke these services into seven categories used to help develop and manage spend data:

- **Engineering Management Services:** contractual services such as systems engineering, specifications development, technical assistance, engineering and technical services, simulations, and professional services and technology sharing.
- **Program Management Services:** services related to research, development, test, and evaluation (RDT&E) management and support, special studies and analysis, operations research, policy review and development, program evaluation, program management/support, program review/development, and management services/contract and procurement.

- Logistics Management Services: support of logistics involving the integration of information, transportation, inventory, warehousing, material handling, and packaging, and occasionally security.
- Management Support Services: contractual services that provide assistance or advice for the efficient and effective management and operation of an organization.
- Administrative and Other Services: material management, courier and messenger support, transcription, mailing and distribution, library services, word processing and typing, stenography, and administrative technical support for conferences and training programs.
- Professional Services: contracted services that provide organized, analytical evaluations in support of policy review and development, program management support, operations research, simulation services, specifications development, systems engineering, analyses, or evaluations.
- Education and Training: contracted services that provide education and training assistance (DAU, n.d.-b.).

The DAU referred to the outcomes provided by these services as “information, advice, opinions, alternatives, analysis, evaluations, recommendations, training, and the day-to-day aid of support personnel needed for the successful performance of ongoing Federal operations” (DAU, n.d.-b.). In 2010, the DoD categorized knowledge-based services into the previously mentioned seven categories, spread throughout 25 sub-categories containing 218 product service codes (PSCs; OUSD, 2010b). Table 1 provides an example of knowledge-based services within each of the seven categories.

Table 1. Example of Services Taxonomy

Service Description	Product Service Code (PSC)	Category	Sub-Category
R&D-Agriculture Insect and Disease Control (Mgmt)	AA16	Program Management Services	RDT&E Management Support
Personal Care Services	R401	Professional Services	Professional Services
Simulation	R412	Engineering Management Services	Simulation
Word Processing/Typing Services	R607	Administrative & Other Services	Administrative Support Services
Accounting Services	R703	Management Support Services	Business Financial Management
Scientific and Management Education	U004	Education & Training	Education & Training
Logistics Support Services	R706	Logistics Management Services	Logistics Support Services

Although many for-profit sector firms have various ways of categorizing services, there is not a universal standard for for-profit sector firms to follow. The for-profit sector also has many different meanings for what makes up knowledge-based services. Javalgi, Joseph, and LaRosa (2007) defined *knowledge-based services* as “those which are relatively intensive in their inputs of human capital (e.g., people know-how skills) and information and communications technologies” (p. 371). The authors also stated that “knowledge-based services possess additional unique characteristics such as high customization, complexity, risk and uncertainty” (Javalgi et al., 2007, p. 371). Much like the DAU, Javalgi et al. (2007) categorized knowledge-based services as “management and engineering consulting, information technology and training services, architectural services, and educational services” (p. 371). Debely, Dubosson, and Fragniere (2008) stated that “knowledge-based services are relying on people who use their heads more than their hands to produce value” (p. 169). The authors also considered knowledge-based services as “all services delivered by highly educated and informed employees responding to specific diagnosed customer demands by offering and delivering customized value-added solutions and relations” (Debely et al., 2008, p. 170).

C. THEORIES

The definition of *theory* depends on the field of study. John Wacker (1998) presented three different issues raised by practitioners of theory. Some researchers believe a theory to be abstract and without a need for testing or application (Wacker, 1998). Other researchers believe a theory to be good only if investigated through trial and error (Wacker, 1998). Finally, a good theory must show the measurements used to validate testing outcomes (Wacker, 1998). According to Whetten (1989), a good theory must contain the questions of what, how, why, and the combination of who, where, and when.

Whetten (1989) suggested that a good theory begins by establishing the factors needed to explain “what” a researcher is exploring. He discussed the importance of utilizing only relevant factors and eliminating factors that contribute little benefit (Whetten, 1989). Exploring irrelevant factors can be cumbersome and can often prolong or even discredit the research project. After determining the relevant factors, the researcher needs to link the relevant factors and identify “how” they relate to one another (Whetten, 1989). Linking the relevant factors establishes patterns and can often show causality (Whetten, 1989). Whetten (1989) joined the “what” and “how” to develop the underlying subject of the theory. This step of theory development can help to eliminate irrelevant factors. Once the relationships develop between “what” and “how,” Whetten (1989) addressed the question, why would others render credibility to the research? To answer the “why” of a good theory, Whetten (1989) explored the conditions set by human nature, organizations, and processes. He used these conditions to establish reasonableness of the proposed concept (Whetten, 1989). From the combination of the “what,” “how,” and “why” emerges a modest theory ready for exploration. It is through the testing of the “what,” “how,” and “why” that the final stage of “who,” “where,” and “when” is revealed (Whetten, 1989). The “who,” “where,” and “when” stages establish limitations and the range of a good theory (Whetten, 1989). Although boundaries can sometimes limit the research, Whetten (1989) depicted the importance of exploring the effects of time and

context relating to people and events. By addressing time and context, a researcher can ensure that he or she includes all of the respective geographic locations, as well as the diverse amount of experience throughout the world. Without theories in the business world, many firms have nothing to base decisions on other than what they personally observe within their realm of influence.

Since 2001, the DoD has increased the use of service contracts due to the support of the Global War on Terrorism, government policy, and conditions favoring the use of for-profit sector resources (GAO, 2007c). Specifically, between FY2005 and FY2011, the DoD increased the use of knowledge-based services from \$28.3 billion to \$45.2 billion (DPAP, 2012; GAO, 2007a). Because the DoD is essentially buying knowledge in seeking efficiencies, it is important to discuss knowledge management and knowledge flow theory to highlight potential issues in obtaining, storing, or diffusing knowledge within an organization.

1. Knowledge Management

According to Becerra-Fernandez and Leidner (2008), knowledge management (KM) “has been viewed as an increasingly important field of study that promotes the creation, capture, sharing, and application of an organization’s knowledge” (pp. 3–4). The authors defined KM as “performing the activities involved in discovering, capturing, sharing, and applying knowledge so as to enhance, in a cost-effective fashion, the impact of knowledge on the unit’s goal achievement” (Becerra-Fernandez & Leidner, 2008, p. 6). Effective knowledge management within an organization can lead to a competitive advantage. A recent study conducted by California State University revealed that on average, companies that effectively managed their knowledge achieved a 5% increase in their return on sales, return on assets, operating income to assets, and operating income to sales (Holsapple & Wu, 2011). Benefits of effective KM include superior knowledge acquisition, superior storage and retrieval, superior sharing and dissemination, and superior decision-making (Holsapple & Wu, 2011).

Unlike a few decades ago, when employees stayed at a company for their entire career, most employees today stay an average of 4.4 years at one job, which equates to about 15–20 moves over the course of an employee's career (Meister, 2012). The increased turnover in employees has caused firms to continuously figure out ways to capture knowledge from their employees, suppliers, and purchasers to obtain a competitive advantage. For many employers, waiting until an employee leaves the firm to realize that the firm never captured key knowledge can cause a firm to lose money, time, and possibly its competitive advantage.

For employers to capture knowledge from their employees, they must understand the difference between tacit and explicit knowledge. *Explicit knowledge* is information and knowledge easily captured in some sort of trade secret, patent, copyright, process, written instructions, or documents (Nissen, 2006). *Tacit knowledge*, on the other hand, is knowledge specific to an organization and gained through experience (Nissen, 2006). The problem with tacit knowledge is that it does not flow freely, it is difficult to transfer, it is not easily understood by others, and it is often taken for granted until it is gone (Nissen, 2006).

The first step for an organization that seeks to improve KM is to determine what type of knowledge they need to capture and how they are going to capture it. According to Silvi and Cuganesan (2006), an organization must identify “knowledge specificity and the knowledge type (tacit versus explicit)” in order to understand which resources to focus on when seeking out knowledge as a competitive advantage (p. 312). After examining other cost drivers within an organization, management can identify what activities an organization can leverage and how knowledge resources should be used (Silvi & Cuganesan, 2006). Figure 4 depicts the cost-knowledge management framework mentioned previously.

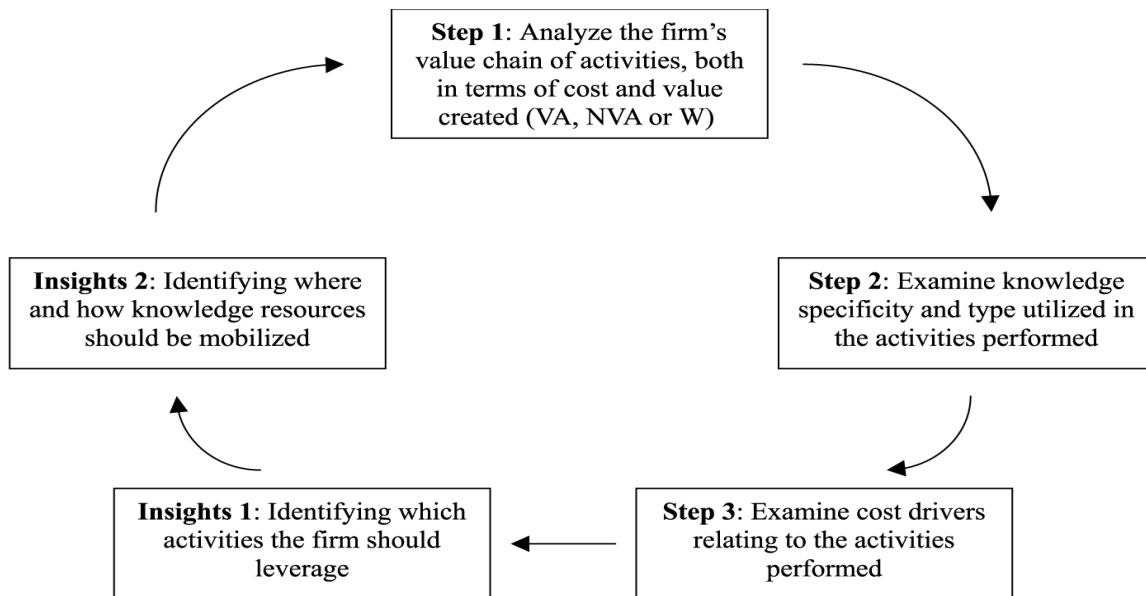


Figure 4. Cost-Knowledge Management Framework
(From Silvi & Cuganesan, 2006)

Additionally, managers must consider how to collect the knowledge within the organization. Although internal sources of knowledge are pivotal in transferring business-level knowledge to executive level understanding, the internal sources can also be biased (Henderson et al., 2001). External sources of knowledge collectors can often provide an objective level of expertise contributing to the deep and complex capturing of knowledge (Henderson, Sussman, & Thomas, 2001).

If a firm manages to collect knowledge and information from its employees, the firm then faces the challenge of how to manage and store that knowledge. According to Alavi & Leidner, “The success of a knowledge management system, partially depends on the extent of use, which itself may be tied to system quality, information quality, and usefulness” (2001, p. 130). Laberta (2010) described some of the general types of information management systems that include the following:

- data-processing systems,
- management information systems,

- decision support systems,
- executive information systems,
- expert systems, and
- intelligent systems.

Examples of such information management systems include NetSuite information management software, cash registers, inventory control systems, online help systems, programs that can act on behalf of humans, and Microsoft Access database software.

The DoD has several information technology (IT) systems that contain vast amounts of information made available for everyday use and decision-making. DoD contracting officers use the DAU, DPAP, Federal Business Opportunities (FBO), Federal Procurement Data System (FPDS), Electronic Document Access (EDA), Defense Acquisition Management Information Retrieval (DAMIR), and their own internal SharePoint websites, just to name a few. Contracting officers use these websites to track training, post policy and regulations, solicit proposals and bids, award contracts, store completed documents, and share information. As with any IT system, the websites are only as good as the people who maintain them. If individuals, groups, or organizations within the DoD contracting community create cost-saving knowledge and fail to share it with the thousands of other contracting officers worldwide, they allow the DoD to incur unnecessary costs for the same commodity or service. Additionally, if policy-makers fail to enforce standards for data input, personnel may eliminate critical data that could impede its future use. Davenport (2011) recommended that managers match KM systems by considering the degree of complexity and the level of interdependence among employees. However, Nissen (2006) believed that although information flows through IT systems, physical reports, and other communication devices, it is experience and information that produce knowledge. Facing the loss of many experienced contracting officers, the DoD must encourage knowledge collaboration at the individual, group, and organizational levels.

Lund, Manyika, and Ramaswamy (2012) found that despite the many available KM systems and the productivity improvement resulting from those systems, the next challenge is to meet the needs of the ever-changing workforce while retaining the knowledge competitive advantage. Lund et al. (2012) offered three techniques to help retain knowledge workers and avoid losing the knowledge-based competitive advantage:

- break jobs down to eliminate tasks traditionally performed by knowledge workers that other non-knowledge workers could perform, thus utilizing a shortage;
- go virtual to allow knowledge workers the flexibility to work from home, thus saving money in overhead costs; and
- make work more flexible by having a mixture of full-time, part-time, in-office, remote, and temporary knowledge workers, thus lowering overhead costs.

Additionally, Dewhurst et al. (2013) recommended outsourcing knowledge-based work to a lower-cost geographic region as another means of retaining knowledge workers and the competitive advantage. As with any change, managers must communicate with employees and ensure that all employees understand and support the change. Another challenge for managers will be to transfer knowledge when many of their knowledge workers never interact with the in-office workforce.

It is important to have the right information at the right time and location when needed. There are various transfer methods, including email, databases, meetings, seminars, conversations, and everyday employee interactions. British Petroleum uses IT to transfer knowledge by videoconferencing (Alavi & Leidner, 2001). The company uses videoconferencing to display images of attending personnel, technical data, video clips, contract information, and ongoing issues (Alavi & Lediner, 2001). While in Afghanistan, the Joint Task Force also used videoconferencing to communicate and collaborate with the Central Command in Florida, which allowed both groups to display attendees, data, and present information relating to the loan and foreign military sales of equipment for coalition partners. The Center for Army Lessons Learned (CALL) uses

multimedia techniques to transfer tacit and implicit knowledge to support the transfer of authority from one unit to another during deployments (Henderson et al., 2001). CALL uses its website to post videos, images, and rich textual accounts that allow soldiers to rehearse future tacit experiences and commanders to learn tacit nuances experienced by their predecessors (Henderson et al., 2001). CALL continually conducts interviews, records real-time videos, processes real-time images, and transforms them into useful knowledge broadcasted for use by hundreds of thousands of military personnel. It is often difficult for organizations to synchronize personnel across time and location, and because knowledge can flow in an informal and formal setting, with or without IT, it is important for managers to understand that communication and information flows drive knowledge transfer (Alavi & Leidner, 2001).

2. Knowledge-flow Theory

Before discussing how knowledge flows within an organization, it is important to differentiate between information and knowledge. Nissen (2006) stated that “knowledge enables action (e.g., correct decisions, appropriate behaviors, useful work), whereas information provides meaning and context for such action (e.g., decision criteria, behavior norms, work specifications)” (p. 12). He went on to demonstrate this difference by providing the exact same information to two workers but with significantly differing experience. Although these two individuals had access to the same information (e.g., computers, networks, reports, books), it was their experience that made the difference in knowledge (Nissen, 2006). However, experience can also impede knowledge if used routinely as a repetitive rather than an adaptive activity (Hartley, Rashman, & Withers, 2009).

Knowledge flow within an organization, whether tacit or explicit, is only as good as the method that employees within a firm use to keep it flowing. Tacit knowledge tends to flow within an organization very slowly, whereas explicit knowledge tends to flow very broad and quickly. Nissen (2006) pointed out

activity as the key to knowledge flow. He used Newton's law of motion to explain that knowledge confined within an individual, or even in an IT system, tends to stay at rest unless there is some sort of activity (e.g., training, mentoring, research, trial and error, discussion) to spark the learning process (Nissen, 2006, p. 34). Activity causes continuous learning, whether it is in the business or academic realm. Nissen (2006) explained that although some of this knowledge is not equally distributed, the more explicit and tacit knowledge a firm applies through action and performance, the more likely the organization will gain a competitive advantage. Organizations that rely on explicit knowledge for a competitive advantage are susceptible to imitation by competitors, whereas organizations that rely more on tacit knowledge for a competitive advantage are more sustainable because tacit knowledge is difficult to imitate.

Although knowledge flow happens around us every day, it takes time to perfect or even grasp. Nissen (2006) pointed out "as a general rule, individual knowledge does not flow well through an organization" (p. 11). He went on to provide many examples of the difference between an expert's performing an activity versus the expert's teaching someone how to perform the activity. The latter of the two would take more time and effort, versus just allowing the expert to perform the activity, but it would generate learning and knowledge flow. Winter and Zollo (2002) identified experience accumulation, knowledge articulation, and knowledge codification as the three learning mechanisms in the development of dynamic capabilities within an organization. *Experience accumulation* is experiential learning through trial and error of tacit knowledge and explicit routines (Winter & Zollo, 2002). *Knowledge articulation* refers to implicit knowledge articulation through constructive confrontations of colleagues in order to understand how to execute and perform a task better (Winter & Zollo, 2002). *Knowledge codification* refers to the documented codification of an individual's understanding of performance implications and routines (Winter & Zollo, 2002).

Nissen (2006) also addressed knowledge within groups. Groups with the same information may very well outperform other groups due to the level of tacit

knowledge within the groups. It is important for groups to interact with each other to share outcomes and help eliminate redundant work and potential lost opportunities, such as one group's spending time creating a process that the other group has already created. Groups, as opposed to individuals, tend to be the source of most activity within an organization (Hartley et al., 2009).

3. The Spiral of Knowledge

Ikujiro Nonaka (2007) developed the spiral of knowledge model to display knowledge creation and knowledge flow. Figure 5 depicts the knowledge creation cycle. The center of the model begins with knowledge creation from an individual, group, or organization. The individual, group, or organization passes this new knowledge on to others through socialization or articulation. Once the individual, group, or organization explicitly captures the knowledge, this knowledge, in combination with other tacit or explicit knowledge, can create something new or build on an individual's tacit knowledge. As long as knowledge creation and sharing continues, the spiral continues to turn. Nonaka (2007) broke down tacit and explicit knowledge into four categories that are usable in any organization:

- From Tacit to Tacit: sharing knowledge from one person to another through socialization;
- From Tacit to Explicit: articulating tacit knowledge into usable information that someone else can use;
- From Explicit to Explicit: combining pieces of explicit knowledge into something new; and
- From Explicit to Tacit: personnel take explicit knowledge and internalize it in order to build upon their tacit knowledge.

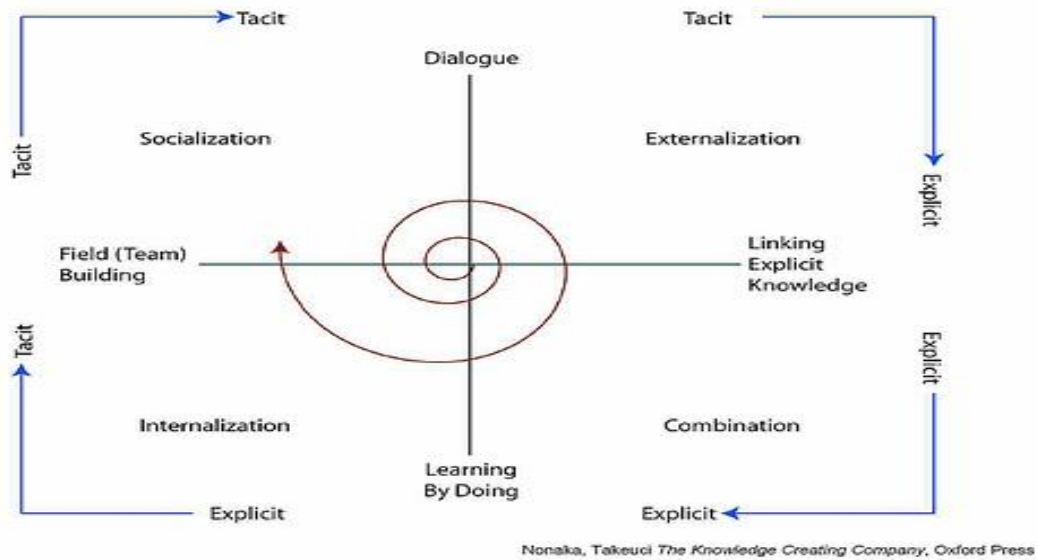


Figure 5. The Spiral of Knowledge
(From Nonaka & Takeuchi, 1995)

4. Knowledge-flow and Workflow Interactions

Nissen (2006) used an example of a student learning from an instructor. The instructor produces knowledge flow by conducting the activity of teaching the student. This knowledge flow then continues as students interact with other students, tutors, or other professors. Nissen (2006) contrasted this example with a worker flipping burgers. The student is learning through the knowledge process, whereas the worker is doing through the workflow process. Both people are learning to some degree, but when it comes to knowledge flow, the student is gaining more knowledge because he or she focuses on learning and not on working. The worker will only learn minimal things to be successful on the job, thus creating the workflow instead of the knowledge flow. Figure 6 depicts Nissen's (2006) relationship that "education contributes principally toward knowledge flows (learning) and negligibly toward workflows (doing); work in a fast-food restaurant has inverse contributions with respect to learning vs. doing" (p. 39). Whether a person is on the knowledge-flow path or the workflow path, both paths may conduct research that will alter the vectors in Figure 6.

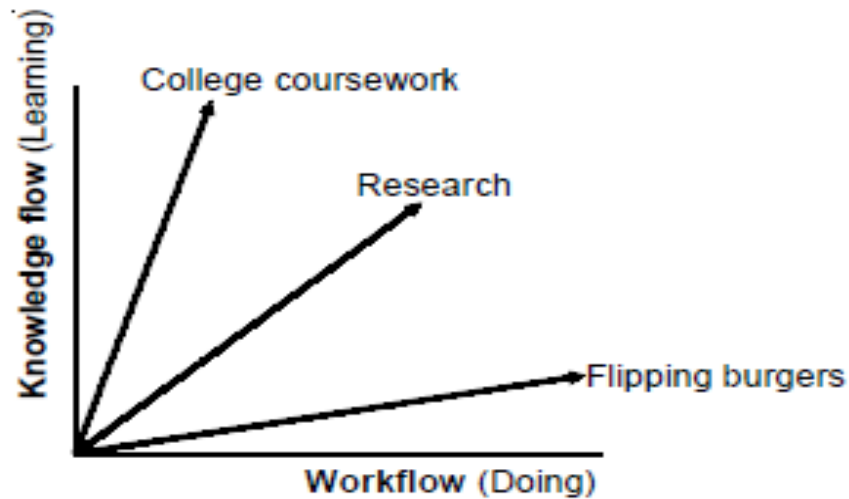


Figure 6. Knowledge-flow and Workflow Contributions
(From Nissen, 2006, p. 39)

5. Knowledge-flow Obstacles

Nissen (2006) addressed four main obstacles to the flow of knowledge within an organization. First, inactive knowledge not flowing within an organization, tacit or explicit, is underutilized. Sometimes employees fear that giving up knowledge, especially when competing against others, will make them less valuable (Hansen & Nohria, 2004). Additionally, employees may retain knowledge because they do not have time to help others and because they want to retain knowledge to obtain a good evaluation (Hansen & Nohria, 2004). Sometimes, power and influence can also cause people to manipulate or withhold their knowledge (Hartely et al., 2009). Next, a person must have the ability to learn so that he or she can create and share reliable knowledge. Sometimes people within a department or group tend to value their own viewpoints and beliefs, resulting in the rejection of external knowledge (Hansen & Nohria, 2004). Additionally, employees may not have the time or resources available to obtain knowledge while on the job or through higher education. Third, once the person is competent, he or she must be willing to share knowledge and transfer it effectively. Employees who have not learned to work together or who are from different organizations tend to have difficulty in

transferring tacit knowledge, especially if the knowledge relates to complex technologies or best practices (Hansen & Nohria, 2004). Additionally, cultural issues such as beliefs, trust, leadership, relationships, social media, and internal and external networks can impair knowledge transfer (Hartley et al., 2009). The last obstacle is that a person must have internalized knowledge before he or she can apply or share it. Employees may find it difficult to locate expert personnel or information required to complete a task, resulting in lost knowledge by the employee and less efficient work (Hansen & Nohria, 2004). Although these obstacles may seem simple, not all people are free and willing to learn, share, or manage knowledge.

Nissen (2006) presented five ways for leaders to overcome these obstacles to knowledge flow. First, managers and leaders must allow and encourage the appropriate knowledge (restricted or unrestricted) to flow within their organization. Next, managers and leaders need to understand the type of knowledge required (tacit or explicit) and how accessible the knowledge is for a particular task, because tacit knowledge tends to move slower than explicit knowledge. Another way to overcome knowledge-flow obstacles is for managers to ensure that all the required knowledge flows are complete and that the critical path is identified prior to employees performing work, thus eliminating wasted time and resources. The fourth way to overcome the obstacles is for managers to consider the premium on workflows versus knowledge flows within the organization. Here, managers must decide whether a task requires learning the task through education or learning by doing the task (on-the-job). Finally, Nissen (2006) recommended that managers need some kind of model to pull together the various factors, considerations, and alternatives associated with workflows and knowledge flows and to help support informed decision-making.

Hansen and Nohria (2004) presented three ways to overcome these obstacles to knowledge flow. First, leadership must demonstrate and emphasize the importance of collaboration, articulate teamwork values, and develop unified goals in order to motivate employees to seek or share knowledge. If employees

see leaders collaborating and living up to values and goals and not just telling everyone else to do it, employees will be more likely to share or provide the required knowledge. Next, employers should use a willingness to seek or provide help as a criterion for hiring and promoting personnel. Finally, employers must develop a means of cross-cultivation relationships within an organization, establish a directory of experts by area, and develop a benchmark system that allows employees to identify best practices.

IBM, which works with multiple not-for-profit and for-profit sector knowledge-based organizations, believes that companies who properly apply KM can have a huge impact on the company's bottom line (Fontaine & Lesser, 2002). The company offered five roadblocks that organizations face in knowledge flow (Fontaine & Lesser, 2002):

- failure to align knowledge management efforts with the organization's strategic objectives;
- creation of repositories without addressing the need to manage content;
- failure to understand and connect knowledge management into individual's daily work activities;
- an overemphasis on formal learning efforts as a mechanism for sharing knowledge; and
- focusing knowledge management efforts only within organizational boundaries. (p. 1)

The DoD addresses many of these obstacles. It has multiple databases available across its organizations to search for information, move employees around frequently to encourage knowledge sharing, provide numerous opportunities for increased education via distance or in-class learning, and appropriately provide access to restricted and unrestricted data. Despite its efforts, the DoD still has problems with cross-collaboration between its departments. Up until the last few years, when the Better Buying Power initiative came out, the DoD did little to promote procurement departments working with each other. The DoD needs to address the differences between its departments'

contracting offices and create an open contracting system that will encourage every department to share information and knowledge.

Much of the aforementioned literature pointed out that KM is important in creating, storing, and transferring knowledge and, if harnessed, that knowledge can build a competitive advantage. Although this sounds fairly simple, the virtual work environment, the changing workforce, IT systems, personnel's willingness to share knowledge, and evaluations are just a few of the obstacles employers face as they attempt to harness knowledge within their organizations.

D. STRATEGIC SOURCING

According to the OMB (2005), "strategic sourcing is the collaborative and structured process of critically analyzing an organization's spending and using this information to make business decisions about acquiring commodities and services more effectively and efficiently" (p. 1). One for-profit sector firm stated, "Strategic Sourcing will be defined as the process of evaluating, selecting, and aligning suppliers or consortiums of suppliers to achieve operational improvements in support of an organization's strategic goals" (Duffie & Koester, 2005, p. 3). The for-profit sector offers multiple definitions of *strategic sourcing*, depending on the strategies used for its respective corporations. Despite the multiple definitions, both the for-profit and not-for-profit sectors focus first on spend analysis and then leverage a respective area that will help cut costs while still providing quality products and services. Between 1999 and 2001, John Deere reaped a \$490,000 cost savings by replacing an expensive, one-time-use leather glove purchased over 12 months across 15 plants with a cheaper, dual-use leather glove by analyzing data, consolidating multiple purchases, rationalizing the spend, and standardizing the glove (Moody, Nelson, & Stegner, 2001). John Deere also hired former experts from Holiday Inn and Marriot hotels to analyze consolidated lodging expenses over a three-year period; information that has helped these companies to negotiate down lodging expenses from \$58 per night to \$38 per night (Moody et al., 2001). Both of these John Deere

success stories hinged on having the right caliber of personnel working in the purchasing department. Although the for-profit sector has recognized the benefits of strategic sourcing as far back as the 1970s, the DoD continues to struggle with implementing its own agency-wide framework for strategic sourcing (GAO, 2012c).

1. History

In the early 1970s, many top leaders did not value their purchasing department, instead treating purchasing as more of an administrative function (Ellram & Carr, 1994). It was not until the oil shortages in 1973–74 that leaders began to look at the importance of purchasing; however, many leaders still did not incorporate purchasing into their corporate strategies (Ellram & Carr, 1994). In 1980, Michael Porter introduced his “five forces” model, which contributed to the recognition of the value of the purchasing function (Ellram & Carr, 1994). Some leaders began to recognize the purchasing department because the purchasing agent negotiated the terms and conditions of the contract and would ensure on-time delivery (Slaight, 2004). At the same time, executives and managers saw the purchasing agent as the leveraging power.

After conducting a case study on 15 firms, Robert F. Reck and Brian G. Long discovered that purchasing departments must travel through four phases of purchasing development before corporate leaders recognize them as a tool to aid in gaining a competitive advantage (Ellram & Carr, 1994). The passive phase is composed of purchasing agents reacting to requirements from other departments (Ellram & Carr, 1994). The independent phase requires the purchasing department to be proactive by developing efficient systems or programs that are recognized by leaders and managers (Ellram & Carr, 1994). In the supportive phase, top leaders and management recognize the purchasing department as crucial to business functions (Ellram & Carr, 1994). In the integrative phase, top leaders and management believe that success and competitive advantage primarily rest with the purchasing department (Ellram & Carr, 1994). Some

variables that determine the maturity of the purchasing department include the organizational view of the purchasing department, the integration level of purchasing department, the proactiveness or reactiveness of the purchasing department, and the size of the organization. Not only is it important for leaders and managers to recognize the purchasing department, but it is equally important for them to address how they should analyze purchasing decisions.

In 1983, Peter Kraljic, in a seminal article in the *Harvard Business Review*, posited that purchasing must become more strategic—supply management. He developed a purchasing portfolio model to categorize types of spend as strategic (high-profit impact, high supply risk), leverage (high-profit impact, low supply risk), bottleneck (low-profit impact, high supply risk), or noncritical (low-profit impact, low supply risk; Kraljic, 1983). Strategic (critical) decisions focus on forecasting, modeling, market analysis, risk analysis, and make-or-buy decisions, while non-critical decisions focus on product standardization, volume, efficient processing, and inventory optimization (Kraljic, 1983). Leveraged decisions focus on tendering, target pricing, substitution, and order volume optimization, while bottleneck decisions focus on volume insurance, vendor control, inventory security, and backup plans (Kraljic, 1983). Kraljic (1983) believed that the following two factors could determine an organization's supply strategy by exposing its purchasing power and level of risk:

- The strategic importance of purchasing in terms of value added by product line, the percentage of raw materials in total costs, and their impact on profitability.
- The complexity of the supply market gauged by supply scarcity, pace of technology and/or material substitution, entry barriers, logistics cost or complexity, and monopoly or oligopoly conditions. (p. 110)

During this same period, purchasing evolved into “outsourcing” as a means to cut costs, improve delivery, and obtain better-quality items (Slaight, 2004, p. 24). Although many viewed outsourcing as a harsh business practice, it afforded a firm a chance to gain a competitive advantage. It also forced local suppliers and engineers to think “outside the box” or lose potential clients to

outsourcing. Additionally, firms began re-engineering within their organizations to replace expensive business practices with cheaper outsourced ones (Slaight, 2004).

Slaight (2004) presented a seven-step model, shown in Figure 7, for organizations to utilize after conducting a spend analysis to determine categories as critical, leveraged, bottlenecked, or noncritical.

The Seven-Step Sourcing Process

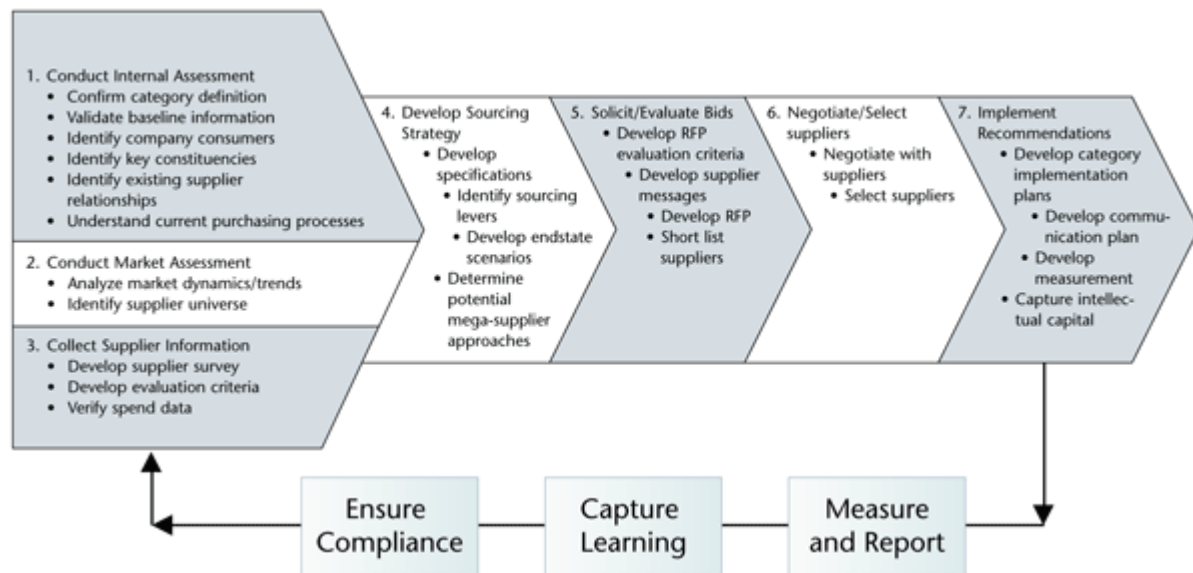


Figure 7. The Seven-Step Sourcing Process
(From Slaight, 2004, p. 3)

Although the seven-step process helped many firms to realize inefficiencies, not all firms used it. Theoretical tension between competition and collaboration with suppliers, decreased interest by executives and managers, and the lack of tools to obtain current spend data kept many firms from employing this model (Slaight, 2004). Today, there are many models used to make strategic purchasing decisions that all depend on the organization and relationships between the suppliers and purchasers.

In 2007, center for advanced procurement and supply CAPS Research developed a 10-step strategy implementation process as part of a continuous

research project (Monczka & Petersen, 2011). Because organizations frequently fail during implementation, CAPS Research focused on tracking multiple organizations over various industries. CAPS Research also developed 22 industry-wide tenets of strategic sourcing (discussed later in this chapter) for these organizations to implement using the 10-step transformation process (Monczka & Petersen, 2011). Table 2 depicts the 10-step model (Monczka & Petersen, 2011).

Table 2. 10-Step Implementation Process
(From Monczka & Petersen, 2011)

PROCESS STEPS
1. Develop the case for change with executive engagement. What is driving the need for transformation (e.g., supplier performance, exploding purchase prices, margin reduction, worldwide supply disruptions, need for innovation, and/or increasing supply risk)?
2. Identify the big goals that the organization has to achieve (e.g., cost reduction, profitability, ROA, and/or product/service innovation) to stay competitive.
3. Determine the most important supply strategies that can contribute to achieving the above goals, with supporting logic.
4. Determine the current state for each supply strategy — based on importance and implementation (companywide and/or by business unit) — and achieve consensus with the executive supply leadership team.
5. Establish “gaps” between importance and implementation by supply strategy area.
6. Achieve consensus by the supply and business leadership team about the benefits to be gained from closing the “gaps.” Establish the general case for supply strategy change.
7. Establish detailed strategies, practices, and timelines and investment required for transforming the supply strategy areas agreed upon as being top five priorities. Identify potential obstacles and how they can be overcome.
8. Develop the specific business case (performance improvements and investment) to support the transformation by supply strategy and gain executive support and resources needed to implement and measure the success of the transformation.
9. Execute the supply strategy transformation. Implement specific changes in an orderly (not haphazard or ad hoc) fashion.
10. Assess and report transformation strategy results at regular leadership team meetings (supply and executives), including supply and firm performance metrics and periodic assessments.

Since the economic crisis in 2008–2009, firms seeking to transform their sourcing strategies often have limited resources (Monczka & Petersen, 2011). It is during the slow economic recovery that firms must be ever vigilant in finding efficiencies in strategic sourcing. Monczka and Petersen (2011) claimed that firms must set clear goals, lock in resources, set transformation priorities, and then follow through with the transformation.

2. Tenets of Strategic Sourcing

As with any strategy, a firm must have a set of principles or tenets that it follows to stay on course and continuously modifies to meet the ever-changing market. In 2002, 2003, and recently in 2012, the GAO addressed a set of broad principles and practices used by leading companies for strategic sourcing. Table 3 lists these broad principles and practices.

Table 3. Broad Principles and Practices of Strategic Sourcing at Leading Companies (From GAO, 2003, 2012c)

Commitment...<i>Secure up front commitment from top leaders</i> <ul style="list-style-type: none">• Recognize and communicate the urgency to change service spending practices• Provide clear and strong executive leadership, including goals and targets
Knowledge...<i>Obtain improved knowledge on service spending</i> <ul style="list-style-type: none">• Develop information system to identify how much is being spent with which service provider for what services• Analyze the data to identify opportunities to reduce costs, improve service levels, and provide better management of service providers
Change...<i>Create supporting structure, processes, and roles</i> <ul style="list-style-type: none">• Create or identify organizations responsible for coordinating or managing service purchases• Establish proactive business relationships between end users, purchasing units, and other stakeholders• Implement more integrated team-based sourcing processes• Create commodity/service experts
Support...<i>Enable success through sustained leadership, communication, and metrics</i> <ul style="list-style-type: none">• Obtain sustaining support from senior leadership to facilitate change• Establish clear lines of communication between all affected parties• Demonstrate value and credibility of new processes through the use of metrics

Source: GAO.

Not all inclusive commitment, knowledge, change, and support are fundamental for a successful strategic sourcing plan, however. Firms that applied some of these principles and practices realized substantial savings and many service improvements (GAO, 2003). Without the basic tenets, a firm will have a hard time breaking through the strong employee work culture that may not understand a much-needed re-engineering process.

Commitment, the first principle, is critical for senior management because they provide guidance, facilitation, and power to implement changes and obtain employee support (GAO, 2002). According to a GAO (2002) study, a lack of top

management buy-in is the root of many restructuring failures. If a firm is going to change its sourcing strategies, not only does the top management need to buy into the restructuring, but it must also follow up to ensure that employees and leaders buy in as well.

The second principle, knowledge, claims that companies need to understand what they are spending their money on so that they can gain or maintain a competitive advantage (GAO, 2002). Companies that conducted spend analysis realized much inefficiency, such as multiple providers, unleveraged suppliers, erratic policies and processes, and limited cross-location information sharing (GAO, 2002). Many organizations spent months trying to obtain spend data because they did not have a system in place to gather and collect such data (GAO, 2002). Although some managers might consider such a lengthy process to be expensive and time consuming, a prudent manager would understand that a small investment today could have a big payoff in the future.

Change, the third principle, requires companies to develop and implement a corporation-wide viewpoint in order for them to get the best value (GAO, 2002). They need to enhance and empower their purchasing organization, assign commodity managers, establish cross-functional teams, conduct market research, carefully select providers, and monitor performance (GAO, 2002). Leading companies that made these changes were able to better manage and coordinate their purchases of services (GAO, 2002). As with any changes in an organization, if the changes lack synchronization, they can create more inefficiencies and problems than the organization first started with.

The final principle, support, requires top management to remain engaged at all times, foster open lines of communication, and utilize measurement tools to monitor and gauge the restructuring process (GAO, 2002). Companies that employed these three techniques found that the techniques were crucial in overcoming opposition, cultural barriers, and other influences that often hinder the restructuring process (GAO, 2002). A good company with a competitive

advantage must stay engaged in all aspects of the business or face possible market loss or hostile takeover.

While conducting the spend analysis and market research, both the not-for-profit and for-profit sectors look at cost drivers, which are usually one of the main driving forces of the contract costs. Cost drivers are elements such as regulatory mandates, machine hours, labor hours, required skills, and travel. The most widely used tool in accounting for cost drivers is the use of activity-based costing (ABC). By using ABC, both the not-for-profit and for-profit sectors are able to identify direct and indirect costs associated with providing services on a contract. This allows both the purchaser and the supplier to better manage their resources and eliminate those cost drivers that are unnecessary in order to cut costs. In 1996, Coopers and Lybrand identified over 120 mandated cost drivers that contributed to an 18% price premium for federally procured commodities and services (GAO, 1996). The top 10 cost drivers listed in this study (GAO, 1996) were

- DoD quality program requirements,
- the Truth in Negotiation Act,
- a cost/schedule control system,
- configuration management requirements,
- contract-specific requirements,
- a Defense Contract Audit Agency (DCAA)/Defense Contract Management Agency (DCMA) interface,
- cost accounting standards,
- a material management and accounting system,
- engineering drawings, and
- government property administration (p. 10).

Although many of the previously mentioned cost drivers are set in place to protect the industrial base, they add costs to a contract and require close monitoring before, during, and after a contract award.

A 2011 assessment conducted by CAPS Research indicated 22 tenets of strategic sourcing (Monczka & Peterson, 2011). The assessment collected data

from 119 organizations over 25 industries to establish the baseline for current and future research (Monczka & Peterson, 2011). CAPS Research began this assessment in 2007 to help firms cope with rapidly changing supply management (Monczka & Peterson, 2011). The extensive list presented as follows, drawn from Monczka and Peterson (2011), depicts the prioritized importance of the 22 tenets:

- engagement by corporate executives and business unit leaders;
- vision, mission, and strategic plan;
- commodity and supplier strategy process;
- strategic cost management;
- procurement and supply organization structure and governance;
- human resource development;
- total cost of ownership (TCO);
- structure and maintaining the supply base;
- measurement and evaluation;
- establishing world-class supplier quality;
- supplier assessment, measurement, and communications;
- cross-functional/location teaming;
- strategic supplier alliance;
- collaborative buyer/supplier development and continuous improvement;
- accelerated change management;
- supplier integration into new products, services, components, and development;
- strategic insourcing/outsourcing;
- standardization of products, services, components, and design specifications;
- e-sourcing and supply chain strategies;
- global sourcing and supply strategy;
- environmentally sustainable supply chain management; and
- supplier integration into customer order fulfillment (p. 21).

For any organization to be successful, whether implementing small or large strategies, the corporate executive and leaders must firmly believe, value, mimic, model, and enforce the new strategies. As discussed in a GAO (2002) report, a lack of top management buy-in is the root of many restructuring failures. There are many different cultural behaviors within an organization, whether it be through common beliefs, common interests, ethnicity, tenure, or an overall work bond. It is important for leaders at all levels to address every behavioral culture to ensure that they bring about change in the overall organizational culture. Leaders should continuously remind all employees of how important they are to the success of the organization. Executives should implement reorganization, set goals, participate, lead, and provide organizational and budgetary support for critical sourcing and supply-chain strategies and initiatives (Monczka & Peterson, 2011). During 2004–2010 procurement transformation, Georgia State executives realized that they needed to be more involved when their employees could not provide adequate solutions to customer feedback (Pennington, 2011). The executives committed themselves to the procurement transformation by attending the Commission for New Georgia (CNG) meetings, recruiting the right personnel, using data-driven project models, implementing technology, and providing heightened visibility in the procurement department, which resulted in cost savings of over \$100 million annually (Pennington, 2011). Although executive involvement is critical for implementing strategies, world-class supply managers need not wait on the executives to buy in to the strategies; they should develop their own understanding of the organization to become part of the executive's agenda (Moody et al., 2001). Additionally, organizations live by many daily-unwritten policies, beliefs, values, and norms; however, when it comes to purchasing strategies and initiatives, it is important for an organization to have a written vision, mission, and strategic plan (Monczka & Peterson, 2011). The written and understood vision and mission helps to explain how a supply network adds value to the success of the organization. The written strategic plan provides a design for how the organization applies and accomplishes work within

the supply network (Monczka & Peterson, 2011). Without an understanding of how the supply network operates, employees may miss opportunities and deadlines, which may cause a loss of profit, potential customers, and current customers.

Once an organization develops its supply network, it can begin developing a commodity and supplier strategy process to help meet its purchasing goals. This strategy includes a blueprint for an organization to categorize and develop strategies on obtaining essential short- and long-term commodities over a one- to three-year period (Monczka & Peterson, 2011). Organizations should look at contracting, supply base, supplier development, product/process design, and value chain considerations (Monczka & Peterson, 2011). This strategy, along with the supply network, will force the organization to plan time lines, force accountability, and measure performance expectations (Monczka & Peterson, 2011).

For an organization to gauge how its suppliers are performing, it needs to develop an evaluation and measurement strategy. Organizations can develop measures to evaluate a supplier's performance, strategies, processes, and cross-team/enterprise performance, as well as develop a scorecard metric to gauge performance against specific measures and objectives (Monczka & Peterson, 2011). Presenting measure and evaluation criteria to the suppliers up front can alleviate any breakdowns in the supply network cause by ambiguous guidance. Additionally, evaluation and measurement criteria can lead to increased efficiencies while still maintaining effectiveness.

Additionally, organizations that rely on many suppliers to provide products or services can face bottlenecks or shortages if the organizations have no oversight of the supply chain. If organizations want to reduce the risk of bottlenecks and shortages, they must establish a quality supplier (Monczka & Peterson, 2011). To do this, an organization must obtain control of the supply chain by implementing internal and external, traditional and innovative quality-control strategies at every stage of the supply chain (Monczka & Peterson, 2011). Although it may cost additional money to control the entire supply chain,

organizations gain the competitive advantage through increased customer satisfaction and stakeholder loyalty (Monczka & Peterson, 2011).

Another strategy of gaining customer satisfaction and stakeholder loyalty is to constantly capture and provide feedback to suppliers about their performance. This strategy helps to identify strategic, preferred, and lagging suppliers. Organizations can provide strategic and preferred suppliers with additional business and develop or remove lagging suppliers from the supply base (Monczka & Peterson, 2011). Organizations can obtain feedback through external customer comments or internal metric and evaluation assessments.

Another strategy that every organization faces today is retaining knowledgeable and skilled personnel to achieve a competitive advantage (Monczka & Peterson, 2011). Executives and leaders must be flexible to meet the needs of the ever-changing workforce. A recent study found that organizations should consider allowing workers the flexibility of working from home, assign non-knowledge-based duties to others, or even offer a mixture of part-time, full-time, in-office, remote, and temporary work to incentivize employees to remain with the organization (Lund et al., 2012). Not every organization can manage their employees in this manner; therefore, other incentives include commissions, vacation packages, stock options, and bonuses, to name a few. Organizations that fail to attract, retain, or train employees run the risk of losing vital tacit knowledge as well as their competitive advantage.

In a competitive environment, organizations must look for ways to minimize cost without reducing quality. Every organization should use strategic cost management to identify and categorize all cost and cost drivers associated with the purchase of products or services (Monczka & Peterson, 2011). Organizations will need to gather information pertaining to such things as design, quality, inventory, transportation, and disposal costs associated throughout the life cycle of the product or service (Monczka & Peterson, 2011). A careful analysis of these categories could result in the identification of a substitute material or service, consolidation of transportation assets, better inventory

management procedures, or a means of recycling that could result in cost savings without sacrificing quality. Many education institutions where instructors provide online interactive classes have realized costs savings by eliminating the physical space required to house students without sacrificing quality. Additionally, organizations can utilize the TCO analysis to determine the relevant costs and cost drivers of buying a product or service from a supplier (Ellram & Siferd, 1998). TCO includes all direct and indirect costs incurred throughout the life cycle of an item, comprising research and development, procurement, operations and maintenance, and disposal (Monczka & Peterson, 2011). Proper TCO analysis can help to identify and eliminate costs not associated with the final product, such as calculating the cost of crewmembers into the total cost of a replacement aircraft because these crewmembers are not managing the research, development, operations, maintenance, or disposal of the aircraft.

Organizations should continuously conduct market research to gain insight into the industrial base that supports their goals. One strategy is for organizations to sort the industrial base by four categories—strategic, preferred, needs improvement, and not usable—to gain a structure that will enable them to use vendors appropriately in order to add value and maintain a competitive advantage (Monczka & Peterson, 2011). When the DoD does not have a major defense acquisition purchase for a supplier within its limited supply base, it will often purchase some sort of improvement, product, or service from that supplier to provide the supplier with enough work to maintain their business. If the DoD does not work hard at implementing supply-base rationalization, it may not have suppliers available when unforeseen requirements arise. Supply-base rationalization involves identifying and managing the correct number of suppliers used to lower prices based on volume, standardized services, and lower costs associated with managing transactions and the supply base (Duffy, 2005).

Standardizing services across various divisions or locations within an organization can also reduce costs. This strategy requires the organization to develop services for use in multiple configurations. The military takes advantage

of standardization by procuring a standard cellular phone package that is the same for all personnel across the continental United States, thereby eliminating multiple contracts for various levels of services. Automobile manufacturers standardize maintenance service packages to support manufacturer's warranties and alleviate dealer service inconsistencies, thereby offering the same level of service to every customer. Some organizations may choose not to standardize some things seen as a core competency—like Apple, which chooses to use its own operating systems in its electronics. The DoD also applies standardization to commodities by purchasing multiple electronic parts like headlights, taillights, and light markers for use on many vehicles. The standardization of commodities or services requires organizational buy-in.

Before making large or complex purchasing decisions, an organization should gather personnel from across appropriate departments to work in tandem to develop purchasing strategies (Monczka & Peterson, 2011). The cross-functional team strategy allows an organization to bring together a diverse group of expert people to assess complex or large procurement decisions, link them to the organization's objectives, and help executives make a well-informed decision. The DoD uses this cross-functional team approach when developing large, complex major defense purchases such as ships, aircraft, vehicles, or weapons. This approach can identify issues up front to alleviate wasted resources.

Much like the cross-functional team strategy, when an organization is developing new products or services, it should integrate the supplier (Monczka & Peterson, 2011). This strategy can also help to eliminate wasted resources up front and strengthen the buyer/supplier relationship. Either the organization can give full responsibility to the supplier, or the organization can just consult with the supplier for information (Monczka & Peterson, 2011). Organizations should consider collaboration to gain all innovative ideas necessary to bring a quality product or service to fruition. Supplier involvement in the development phase of a product or service can increase quality, reduce costs, and improve product- or service-to-market time (McGinnis & Vallopra, 1999).

Many centrally led organizations conduct business with firms abroad and must decide how to control the purchasing authority. One strategy that CAPS Research offered is to develop global commodity councils to act on behalf of the organization in order to link sourcing goals to organizational goals, thereby making it easier to meet the needs of the global customer (Monczka & Peterson, 2011). Although this strategy may seem risky due to the decentralized procurement approach, if managed properly, it can help to establish strong relationships with customers and suppliers abroad. It can sometimes prove difficult for organizations that conduct global business to interact with customers and suppliers if they do not have representation at that geographic location. By assigning global commodity teams, organizations can possibly eliminate some of the risks of receiving substandard commodities and services as well as reduce costs.

Organizations that conduct business abroad should implement a global sourcing and supply strategy. If the organization has developed global purchasing teams abroad, it should utilize those teams to gather information about customers, company needs, and supply bases in order to make decisions (Monczka & Peterson, 2011). By having teams abroad, the organization will be able to better leverage international suppliers as well as help to develop those international supplier relationships. Without an organizational representative that can actually meet with international suppliers, organizations run the chance of shortages and bottlenecks.

Organizations can also gain great efficiency and become more effective by using e-sourcing and supply-chain strategies via the Internet. Online sourcing and supply chain management can keep executives and leaders at all levels informed of purchases, as well as where things are located in the supply chain. Using the Internet can help organizations to streamline manual processes, track supply and demand in real-time, manage suppliers, and purchase supplies (Monczka & Peterson, 2011). Although this information can be beneficial, it can

also hinder a process if the information is not accessible or is not current. Organizations should ensure that they invest in a good KM process.

Organizations can also seek a strategic supplier alliance by conducting a spend analysis, identifying large cost drivers, analyzing risk associated with multiple suppliers, and developing strategic supplier scenarios to collaborate with the best suppliers while reducing the bottom line (Kraljic, 1983). These alliances create long-term partnerships that “leverage the strategic and operational capabilities of individual participating companies to achieve significant ongoing benefits to each party” (Monczka & Peterson, 2011, p. 51). Because start-up production can be costly, many organizations use long-term partnerships with suppliers as a means of lowering the initial cost. Suppliers can then transfer low costs to the customer, thereby increasing an organization’s competitive advantage.

Another strategy to help build supplier alliances is to collaborate and develop the supplier and to constantly seek improvement (Monczka & Peterson, 2011). Organizations should continuously utilize measures and metrics to refine processes and procedures within their organization as well as in their supply network. This approach looks at the organization and the supplier as a joint venture, seeking out ways to improve, commit joint resources for development, and share the risks and rewards (Monczka & Peterson, 2011). Taking time to develop a supplier can be beneficial in the long term but may also pay off in the short term if a purchaser needs something expedited. Supplier alliances can also help when rapid changes in an organization occur.

An accelerated change management strategy can be difficult on organizations. New technology and innovative processes require that organizations rapidly evolve and shift the entire culture of the organization in a new direction (Monczka & Peterson, 2011). Key to this transformation is the executives’ and leaders’ engagement to gain buy-in from all employees. Monczka and Peterson (2011) suggested that because this rapid change will

occur frequently, “project and process implementation speed should be measured, communicated, and reinforced throughout the organization” (p. 53).

Strategic insourcing and outsourcing is on the forefront of every purchasing decision within an organization. Before organizations make a purchasing decision, they should “evaluate internal capabilities, competencies, and capacity verses external sources and capabilities to identify opportunities to better focus on core competencies, improve product/service differentiation, and develop and sustain competitive advantage” (Monczka & Peterson, 2011, p. 50).

CAPS Research is unique in that Monczka and Petersen have continued to update their research every other year to determine the extent to which firms are applying sourcing strategies. Since the first CAPS Research report in 2007, firms have increased the use of sourcing strategies from 5.27% of the overall strategy implementation in 2007 to 5.50% in 2011 (Monczka & Petersen, 2011). Although there has been an increase in the use of these sourcing strategies among their subjects, firms continue to lag in implementing these critical measures (Monczka & Petersen, 2011). Monczka and Petersen (2011) suggested that firms invest resources and time to the cross-functional and cross-enterprise collaboration in order to be successful.

3. Current DoD Initiatives

After years of working with subordinate agencies to gain efficiencies by using strategic sourcing, the OMB established the Federal Strategic Sourcing Initiative (FSSI) program under the control of the General Services Administration (GSA; 2012). The goals of the FSSI are to

- strategically source across federal agencies;
- establish mechanisms to increase total cost savings, value, and socioeconomic participation;
- collaborate with industry to develop optimal solutions;
- share best practices; and
- create a strategic sourcing community of practice.

Through the FSSI program, the DoD implemented some of the top tenets of strategic sourcing to help create a framework that would meet its goals (GAO, 2012c). However, in FY2011, agencies sent only 15% of their total spending on products and services covered by the FSSI program through the FSSI program (GAO, 2012c). Of that 15% of overall spending, the FSSI program recognized an 18% cost savings (GAO, 2012c). The 18% savings resulted from the consolidated government-wide purchasing of office supplies, domestic delivery services, and telecommunications expense management services (GAO, 2012c). The FSSI program currently utilizes six government-wide initiatives for strategic sourcing: office supplies, domestic delivery services, telecommunication services, print management, commercial off-the-shelf software/services, and wireless rate plans/devices (GAO, 2012c).

Although the DoD has committed to using some of the FSSI contracts, a program acquisition and strategic sourcing (PASS) representative said, “The department would be more likely to commit to current and planned FSSI contracts if those contracts showed significant savings/best value over established DoD contracts” (GAO, 2012c, p. 35). The themes across most of the agencies for not using the FSSI include maintaining control over their contracts, having unique requirements, and boasting that they can get lower prices than the FSSI contracts (GAO, 2012c).

In 2010, Ashton Carter, then–USD(AT&L), started another initiative. He laid out the memorandum *Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending* (OUSD, 2010a). This guidance came because of a “mandate to deliver better value to the taxpayer and warfighter by improving the way the Department does business” (OUSD, 2010a). Carter (OUSD, 2010a) highlighted the following five initiatives with 23 sub-initiatives derived from industry and acquisition experts:

- target affordability and control cost growth,
- incentivize productivity and innovation in industry,
- promote real competition,

- improve tradecraft in service acquisition, and
- reduce non-productive process and bureaucracy.

Since Carter signed this memo, Frank Kendall, the new USD(AT&L), has issued *Better Buying Power 2.0: Continuing the Pursuit for Greater Efficiency and Productivity in Defense Spending* (Kendall, 2012). Kendall (2012) adjusted the initiatives to ensure that the DoD could deliver warfighting capabilities while balancing a declining budget. The new memorandum, signed in 2012, modified existing initiatives and added an additional two initiatives, totaling seven initiatives with 36 sub-initiatives (Kendall, 2012):

- achieve affordability,
- control costs throughout product life cycle,
- incentivize productivity and innovation in industry and government,
- eliminate unproductive processes and bureaucracy,
- promote effective competition,
- improve tradecraft in the acquisition of services, and
- improve the professionalism of the total acquisition workforce.

Over the past few decades, the DoD has focused on promoting efficiencies in the acquisition of products but is now looking at gaining efficiencies in service contracts as well, because more than half of all contract spending involves services. Under the original Better Buying Power initiative, the DoD mandated the use of senior managers in each of the components to improve the acquisition of services (OUSD, 2010a). These senior managers will help to develop market segmentation and a new market research portal and to share service contract management best practices between commands (Kendall, 2012). The DoD will also better define requirements to eliminate requirements creep (Kendall, 2012). It will also strengthen service contract management for services other than research and development and the product support used at installations (Kendall, 2012). The DoD will also leverage the use of small businesses in service contracting as a means of cost saving (Kendall, 2012).

Although all of these initiatives set in motion by the DoD are a great start in transforming the strategic sourcing processes, they are not immune to policies, mandates, and personnel that do not line up with these initiatives. One issue is that procurement officials are unaware of strategic contract vehicles because there is no centralized source of information—and even if there were, many leaders are hesitant to use them for fear of losing the ability to customize requirements (GAO, 2012c). Leaders are also hesitant to report cost savings for fear of budget cuts (GAO, 2012c); likewise, program managers and contractors are hesitant for fear of losing their relationships with suppliers or not having the ability to control the contract (GAO, 2012c). Even now that the DoD has mandated the use of strategic sourcing in its contracts, there is not a centralized measurement tool to depict savings because each component must track these savings in order to report to the DPAP.

E. CONCLUSION

In this chapter, we provided a brief synopsis of topics relevant to the sourcing of knowledge-based services. We started by highlighting the characteristics, workforce issues, and inherently governmental functions as they relate to services, followed by an overview of knowledge-based services. Next, we explored knowledge management issues involving the characteristics and obstacles of knowledge flow. We concluded with the basic history, tenets, and current DoD initiatives of strategic sourcing. A review of the literature pertaining to this research topic is only one of many ways to address our research questions. In the next chapter, we outline the methodology we used to achieve the objective of our research topic.

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III. RESEARCH METHODOLOGY

A. INTRODUCTION

In order to achieve our research objectives and answer our research questions, we have provided an overview of our data collection and analysis in this chapter. We utilized a combination of quantitative and qualitative techniques. With respect to the quantitative research, we started by analyzing the USAF spend data from FY2010 which was supported by a content analysis of contracts data extracted from EDA and FPDS-NG. Additionally, we conducted a qualitative analysis of available literature and undertook action research by conducting interviews. One of our team members attended the 13th Annual Institute of Supply Management (ISM) Services Conference in Phoenix, Arizona. This conference yielded insights into how the for-profit sector applies strategic sourcing principles to the procurement of knowledge-based services. Additionally, the team member identified several subject matter experts for participation in this research. Based on a literature review and an analysis of the USAF spend data, we formulated a questionnaire to gather information to aid in answering the research questions. In this chapter, we begin by listing the methodology we used to answer our research questions, followed by explaining the approach we used to conduct the spend analysis. Additionally, we include the modus operandi used for selection of research participants and development of our interview questionnaire. Table 4 depicts our research questions and the methodology we used to address them.

Table 4. Methodology Used to Answer Research Questions

	Research Question	Methodology
1	What are the relevant tenets of strategic sourcing?	Literature Review & Qualitative Interviews
2	What are commercial best practices in sourcing knowledge-based services?	Literature Review & Qualitative Interviews
3	What are the constraints, if any, of applying the commercial best practices in the USAF context?	Literature Review & Qualitative Interviews
4	What are the different types of knowledge-based services being procured? How much money is spent on these services, with how many different contractors, from how many different buying offices, and through how many different contract actions? How many are with small businesses? How many are sole source? What is the composition by contract type?	Spend Analysis
5	What are the different outcomes/deliverables of contracted knowledge-based services (e.g., technical reports, research, staff support labor, education, training, analysis, advice, briefings, white papers)?	Spend Analysis, Content Analysis & Qualitative Interviews
6	Of the different outcomes of knowledge-based services, what are the major cost drivers (e.g., time, labor rates, skills, travel) of each by type? How are costs minimized?	Content Analysis & Qualitative Interviews
7	Can those cost drivers be better managed to increase efficiency without compromising effectiveness? If so, how?	Cost Driver Analysis & Qualitative Interviews
8	By applying commercial best practices and original ideas, how much cost could be saved or avoided?	Spend Analysis & Cost Driver Analysis

B. SPEND ANALYSIS

Spend analysis is defined as “a tool that provides knowledge about who are the buyers, who are the suppliers, how much is being spent for what goods and services, and where are the opportunities to leverage buying power” (GAO, 2004, p. 2). Although undertaking a spend analysis is a time-consuming and laborious task, a spend analysis has the potential to identify targets of opportunities and current risks in the acquisition of supplies and services (Cook,

Grammich, Lindenblatt, & Moore, 2004). According to Marmanis & Pandit, “Spend analysis can provide holistic detailed visibility into spend patterns, creating a foundation from which opportunities for savings can be identified and actions on them can be taken” (2008, p. XV).

To undertake the research, we analyzed USAF spend data for FY2010. Although the DoD revised the PSC manual in 2011, we used the 1998 PSC manual to better align the PSCs with the 2010 spend data. The DoD divides the PSCs into three main parts:

- Part A: Research and Development;
- Part B: Services; and
- Part C: Supplies & Equipment.

The USAF FY2010 spend data included 147,222 contract actions (including modifications) with a total spend of \$63.03 billion. Out of this total spend, the USAF obligated \$25.85 billion, which was 41.02% of the total spend, towards the procurement of services from Section-1, Part-B (Services), and 82 PSCs pertaining to services in Section-1, Part-A (Research and Development). The 1998 PSC manual did not have a separate category for knowledge-based services; however, the OUSD memorandum *Taxonomy for the Acquisition of Services* clearly identifies 218 PSCs in the category of knowledge-based services (OUSD, 2010b). Knowledge-based services in the FY2010 data of the USAF accounted for an obligation of \$9.77 billion, which was 15.5% of the total spend and 37.82% of spend on services. Most of the spending on knowledge-based services was concentrated in Category R (Professional, Administrative, and Management Services). Category R included a total spend of \$8.32 billion, representing 13.21% of the total spend for FY2010 and 32.19% of spend on services. Category R has three subcategories, namely

- professional services,
- administrative services, and
- management services.

In order to conduct the detailed spend analysis and evaluate the inefficiencies, we narrowed the scope of this research to five PSCs from Category R. These five PSCs were selected based on maximizing the amount of spend under the premise of exploiting potential inefficiencies. These five codes comprised a total spend of \$5.26 billion, which is 8.35% of the total spending, 20.35% of service spending, and 53.82% of knowledge-based service spending for FY2010. Table 5 outlines the details of these five PSCs.

Table 5. Total Spending on Selected PSCs for FY2010

PSC	Description	Spend (U.S. \$)	Spend as a percentage of knowledge-based services
R-408	Program Management / Support Services	765.65 million	9.2%
R-414	Systems Engineering Services	1.91 billion	22.96%
R-425	Engineering and Technical Services	1.27 billion	15.38%
R-706	Logistics Support Services	1.12 billion	13.47%
R-707	Contract, Procurement, and Acquisition Support Services	184.6 million	2.22%

After selecting the relevant PSCs, we identified the number of contractors, the number of different buying offices, the total number of contract actions, applicability of competition, types of contracts, and the number of small businesses for these services.

C. CONTENT ANALYSIS

To effectively conduct an in-depth data analysis and to answer research questions, such as the outcomes of these contracts in terms of deliverables and the cost drivers, we down-selected to 100 contracts. The contracts were evenly divided into the five selected categories based on the highest amount of spend.

We extracted the selected 100 contracts and their performance work statements (PWS)/SOWs from EDA/FPDS–NG. Our team deliberated on all the contracts and their associated PWS/SOWs and subsequently used an Excel spreadsheet to document the deliverables and the cost drivers. The content analysis, in collaboration with the data gathered from the qualitative interviews, helped us to answer our research questions. During the content analysis, we also identified some improper coding within the selected 100 contracts, which we discuss in Chapter IV. The 100 selected contracts in the five PSCs accounted for 22.17% of the spending in the five categories. Table 6 depicts the amount spent on the selected 20 contracts in each category vis-à-vis the total spend in that particular category.

Table 6. Spend on Selected Contracts

S No	PS Code	Spend on Selected 20 Contracts	Percentage of total spend
1	R-408	110,348,723.33	14.41% of R-408
2	R-414	438,937,475.26	22.96% of R-414
3	R-425	194,646,700.74	15.20% of R-425
4	R-706	314,793,589.16	28.07% of R-706
5	R-707	107,841,908.43	58.41% of R-707

D. QUALITATIVE INTERVIEWS

In order to explore the current best practices, one of our team members attended the 13th Annual ISM Services Conference in Phoenix, Arizona, during the week of December 4–7, 2012. Besides gaining insight into how the for-profit sector applies strategic sourcing principles to the procurement of services, the team member identified a number of relevant professionals for interviews. Additionally, we identified businesses supporting CAPS Research, as well as representatives from the not-for-profit sector, for inclusion in the interviews. We invited 83 for-profit and 16 not-for-profit contacts to participate in the research interview. Seven for-profit sector contacts and four not-for-profit sector contacts

participated. Despite the lack of participation and lengthy questionnaire, our team achieved an 11% participation rate, which is within the 10–15% average external survey participation rate.

1. Interview Questionnaire

Based on the spend analysis and literature review, we developed for-profit and not-for-profit interview questionnaires (see Appendix A and B) to answer the following questions:

1. What are the relevant tenets of strategic sourcing?
2. What are commercial best practices in sourcing knowledge-based services?
3. What are the constraints, if any, of applying the commercial best practices in the USAF context?
4. What are the different outcomes/deliverables of contracted knowledge-based services (e.g., technical reports, research, staff support labor, education, training, analysis, advice, briefings, white papers)?
5. Of the different outcomes of knowledge-based services, what are the major cost drivers (e.g., time, labor rates, skills, travel) of each by type? How are costs minimized?
6. Can those cost drivers be better managed to increase efficiency without compromising effectiveness? If so, how?

We formulated two different questionnaires: one for the for-profit sector and the other for the not-for-profit sector. To ensure face validity, two academicians reviewed the questionnaire. Additionally, the Director of the Knowledge-Based Services Commodity Council at Wright–Patterson Air Force reviewed the questionnaire. We made changes based on their expert advice. Subsequently, the assistant dean and a specialist from the Human Research Protection Program at the Naval Postgraduate School (NPS), and the chair of the NPS Institution Review Board (IRB) also reviewed the questionnaire. Finally, the

president of the NPS approved the questionnaire. The questionnaire was composed of 37 questions for the for-profit sector and 28 questions for the not-for-profit sector.

2. Interview Process

The research participants responded to the research questionnaire either via email or through telephonic interview. Out of the 11 interviews, six responded via email and five over the phone. For time and quality purposes, we initially recorded phone interviews and later the Acquisition Research Program (ARP) at NPS transcribed them. We analyzed 114 pages, out of which 38 pages were from email respondents and 76 pages were transcriptions from ARP. We used an Excel spreadsheet to document the participants' answers to the respective for-profit and not-for-profit questionnaire and used this data to answer our research questions.

E. CONCLUSION

In this chapter, we began with a brief synopsis of methodology used to answer our research questions. We then highlighted the strategy used for quantitative analysis (i.e., spend and content analysis). We concluded with a layout of qualitative analysis, describing *modus operandi* for the selection of research participants and the development and evaluation of our interview questionnaire. In the next chapter, we analyze the quantitative and qualitative data followed by the answers to our research questions.

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IV. ANALYSIS

A. INTRODUCTION

The purpose of this chapter is to analyze the FY2010 USAF spend data, analyze the completed interview data, and answer the research questions in light of the literature review. We begin by providing a quantitative analysis of the USAF FY2010 spend data, followed by a qualitative analysis of the responses to for-profit– and not-for-profit–sector interview questions. We conclude by using the qualitative and quantitative analysis to answer the research questions in order to make well-informed recommendations and identify areas for future research.

B. ANALYSIS OF QUANTITATIVE DATA

To undertake the quantitative research, we analyzed the USAF spend data for FY2010 (FPDS-NG, 2010). The USAF FY2010 spend data included 147,222 contract actions totaling \$63.03 billion, with acquisition of services being a major portion of this expenditure. The USAF obligated \$25.85 billion acquiring services, which was 41.02% of the total USAF spend. Out of 147,222 contract actions, 54,448 were initial awards, delivery orders and task orders accounting for \$22.13 billion, while the remaining 92,774 contract actions were modifications, accounting for an obligation of \$40.90 billion.

Because our research focused on analyzing knowledge-based services, we concentrated on the spend data from 218 PSCs in the category of knowledge-based services. Knowledge-based services in FY2010 accounted for \$9.77 billion, which was 15.5% of the total USAF spend and 37.82% of the total spend for services. Out of the total spend of \$9.77 billion on knowledge-based services, \$3.59 billion were obligated on initial awards, delivery orders and task orders, whereas the remaining \$6.18 billion were obligated towards modifications. Out of the total available 218 knowledge-based services codes, 126 PSCs accounted for the entire spend of \$9.77 billion. There was no

expenditure on the remaining 92 PSCs during FY2010. Out of the total expenditure of \$9.77 billion on knowledge-based services, an amount of \$2.47 billion, which corresponds to 25.36% of the spend of knowledge-based services, was not coded under a specific PSC. The recording of the \$2.47 billion expenditure under the title of “other services,” is a convenient approach by the contracting officer to enter the contract data in FPDS-NG when a contract contains multiple CLINs pertaining to different PSCs. As a result, anyone examining the data post hoc may not be able to discern what the USAF bought without opening the actual contracts. Table 7 depicts the details of obligations under the heading of “other services.”

Table 7. Details of Obligations Under “Other Services”

PS Code	Description	Obligation (U.S. \$)
AB96	R&D-Other Svc & Develop (Mgmt Sup)	3,000.00
AC96	R&D-Misc Hard Goods (Mgmt Sup)	1,390,426.00
AD96	Other defense (Mgmt Sup)	10,109,305.18
AJ96	R&D-Other Sciences (Mgmt Sup)	1,371,312.96
AR96	R&D-Other Space (Mgmt Sup)	-232,302.69
B599	Other Special Studies and Analyses	28,9844,386.9
R499	Other Professional Services	1,412,058,413.00
R699	Other Administrative Support Svcs	253,216,164.8
R799	Other Management Support Services	396,644,458.3
T099	Other Photo Mapping Printing Svc	5,189,897.07
U099	Other Ed & Trng Svcs	110,322,910.5
Total		2,479,917,971.53

The USAF conducted all acquisitions of supplies and services in FY2010 through 245 different buying offices. Out of 245 buying offices, 209 buying offices were involved in the acquisition of knowledge-based services. Involvement of more than 80% of the total buying offices in the acquisition of knowledge-based services may deny the USAF opportunities to reduce transaction costs and to reap the benefits of economies of scales through contract consolidation. One for-profit sector interview identified contract consolidation as one of the commercial best practice for achieving efficiencies, which we discuss later in this chapter under Section D (Answer to RQ 2). In addition, fragmented buying and duplication of effort in purchasing knowledge-based services may also prohibit program managers, contracting officers, end users, and functional managers from capturing tacit knowledge to achieve efficiencies. One key tenet of strategic sourcing - developing deep category expertise - is foregone by fragmented buying.

In FY2010, 18,819 different contractors undertook business with the USAF, out of which 3,292 were involved in the provision of knowledge-based services. Of the 3,292 contractors involved in the provision of knowledge-based services, 658 contractors (20%) accounted for 22,207 contract actions representing 81.37% of the total contract actions. We used the 80/20 rule to come up with a figure of 658 contractors. The other 5,084 contract actions distributed among the remaining 2,634 contractors averaged 1.93 contracts per contractor. This highlights the opportunity to realize cost savings in terms of transactional costs by reducing the number of contracts, task orders, and suppliers and resembles the preferred partner approach as practiced by two of the seven for-profit sector interviewees discussed later in the qualitative analysis part of this chapter. Figure 8 depicts the distribution of knowledge-based contract actions among different contractors.

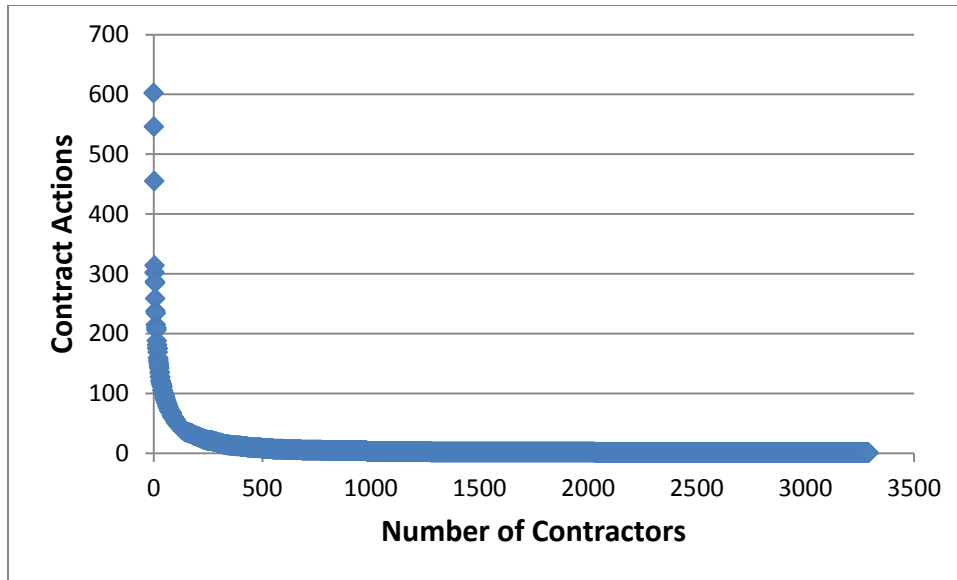


Figure 8. Contractors vs. Contract Actions Distribution

FPDS–NG spend data for FY2010 has a total of 147,222 contract actions, which included 54,448 initial awards, delivery orders and task orders. The USAF acquired knowledge-based services through 27,291 contract actions that included 6,677 initial awards, delivery orders and task orders. Knowledge-based services contract actions accounted for 18.53% of the total contract actions and 12.26% of the initial awards, delivery orders and task orders for FY2010. This relatively low percentage of knowledge-based services in the initial awards, delivery orders and task orders, vis-à-vis total contract actions, highlights that the USAF is spending a substantial amount of total obligations on modifications of original contracts.

Most of the spending on knowledge-based services was concentrated in Category R (Professional, Administrative, and Management Services). Category R included a total spend of \$8.32 billion, representing 13.21% of the total spend for FY2010 and 32.19% of spend on services. In order to conduct the detailed spend analysis and evaluate any inefficiencies, we focused this research on five PSCs from Category R. These five PSCs were selected based on the maximum amount of spend. These five codes comprised a total spend of \$5.26 billion,

which is 8.35% of the total spending, 20.35% of service spending, and 53.82% of knowledge-based service spending for FY2010. Table 8 depicts the details of obligation on these five PSCs including number of contracts, buying offices and the contractors.

Table 8. Spend Detail of Selected Product Service Codes

PS Code	Description	Number of Contract Actions		Obligation (\$) – Total Contracts	Buying Offices – Total Contracts	Contractors – Total Contracts
		Total	Initial awards, DO/TOS			
R-408	Program Management / Support Services	2,855	651	765,656,227.37	95	277
R-414	Systems Engineering Services	3,136	544	1,911,354,865.17	79	209
R-425	Engineering and Technical Services	3,619	788	1,279,979,076.81	122	364
R-706	Logistics Support Services	823	160	1,121,100,763.87	62	112
R-707	Contract, Procurement, and Acquisition Support Services	643	17	184,605,003.55	21	37

In FY2010, the DoD set a goal for small business set-aside contracts at 22.28% of the total obligated dollars and achieved 20.94% (Small Business Administration [SBA], 2013). However, the USAF fell behind the DoD achievements with 14.4% of its obligated dollars going towards small business set-aside contracts (U.S. Air Force, 2012). Although the set-aside percentage is much less than the overall goal of the DoD, it highlights the problems faced by

the USAF buying offices to meet the socioeconomic programs. As per the interview data, none of the for-profit sector buying offices faced any socioeconomic constraint in implementing the best practices for cost savings. The government mandates socioeconomic set-aside goals to the DoD, and Kendall (2012) recognized this as an effective source of innovation that can help in reducing costs. As per the FAR 19.202-1, “Small business concerns shall be afforded an equitable opportunity to compete for all contracts that they can perform to the extent consistent with the Government’s interest” (2013c).

However, the socioeconomic set-aside requirements may make it difficult for the USAF to consolidate contracts and to use preferred partner strategies. For-profit sector interviews identified contract consolidation and preferred partners’ strategies as a means of cost savings, and therefore will be discussed later in this chapter under Section D (Answer to RQ 2). The FSSI program also emphasized cost savings through contract consolidation and socioeconomic participation (GSA; 2012). Through the implementation of the FSSI programs, the government achieved an 18% savings due to consolidated purchasing. (GAO, 2012c). Therefore, while contract consolidation may be difficult, it is not impossible.

While outlining the achievements of federal government procurement in FY2010, the Honorable Daniel I. Gordon, highlighted that the federal government continuously increased the small business participation over the last two years and awarded nearly \$100 billion worth of contracts to small businesses (Gordon, 2011). Gordon was optimistic that more opportunities would open up as the government unveils its modern techniques in small business buying tools (Gordon, 2011). However, during the same time period, the USAF was unable to achieve its small business goals. The trend of the small business participation in the USAF contracts saw a continuous decrease from 2008 to 2011 as depicted in Figure 9 (U.S. Air Force, 2012).

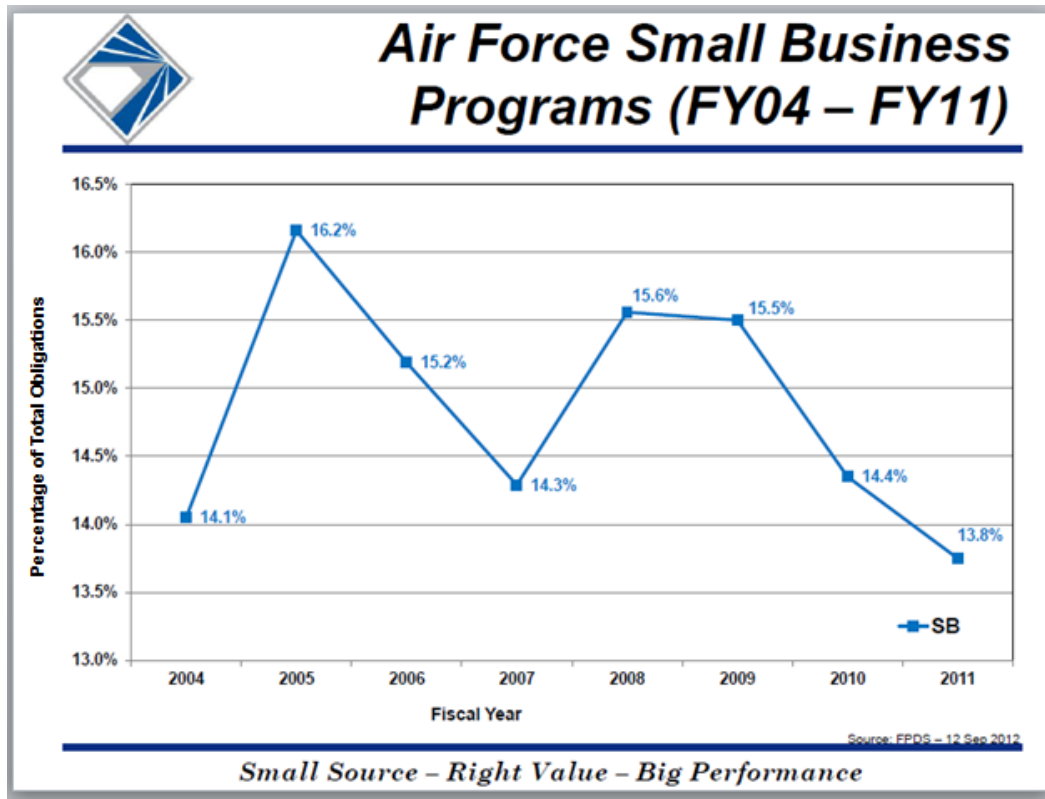


Figure 9. USAF Small Business Programs
(From U.S. Air Force, 2012)

Promoting and creating a competitive environment can result in substantial cost savings. The better buying power 2.0 initiative emphasized promoting effective competition in order to control and reduce costs (Kendall, 2012). However, the FPDS-NG data for the knowledge-based services highlights the presence of 748 out of 2,160 original contracts in our selected five categories as a sole source arrangement. Table 9 depicts the breakdown of sole / single source contracts in the selected five categories.

Table 9. Breakdown of Sole / Single Source Contracts

PSC	Description	Total Original Contracts	Not Available for Competition (Single Source)	Not Competed (Sole Source)	Not Competed Percentage
R408	Program Management / Support Services	651	79	62	9.5%
R414	Systems Engineering Services	544	34	193	35.47%
R425	Engineering and Technical Services	788	118	191	24.23%
R706	Logistics Support Services	160	13	50	31.25%
R707	Contract, Procurement, and Acquisition Support Services	17	6	2	11.76%
Total		2160	250	498	23.05%

Out of the total original contracts, 250 contracts were 'not available for competition', while the remaining 498 contracts were 'not competed'. 'Not available for competition' are single-source set-aside contracts in which the buyer chooses a specific company due to its peculiar requirements and by-passes competition. For example, contract number FA820110R0016 in Program Management / Support Services (R-408) was not available for competition; the contract was a set-aside and only one offer was received (FPDS-NG, 2010). 'Not competed' are sole sourced contracts where the buyer searched for suppliers and discovered that only one vendor was available. For example, contract number FA483010MS012 in Program Management / Support Services (R-408) was not competed and also was not a set-aside (FPDS-NG, 2010). Four-hundred and ninety eight contracts in the category of not competed, represent 23.05% of all knowledge-based contracts in our selected five categories, which depict a possible opportunity for supplier development and cost savings. However, the opportunity of supplier development varies with respect to the services contracted. As per our selected PSCs, maximum opportunity lies in R414 (Systems Engineering Services), where 35.47% of the contracts were not

competed. Creating competitive environment in sole-source knowledge-based contracts presents an opportunity of savings for the USAF.

The USAF used a variety of contract types while procuring knowledge-based services. Table 10 depicts the breakdown of 2,160 contracts in the selected five PSCs by contract type. In 45.69% of the fixed-price contract actions, the liability of cost overruns was inclined towards the contractor, whereas the remaining 54.31% of the contract actions (cost reimbursement, labor hour [LH] and time and material [T&M]) placed more cost risk on the government. On the other hand, our analysis of the for-profit sector interviews reflected that four out of seven respondents preferred the use of fixed-price contracts where the performance risk lay more with the contractor.

Table 10. Breakdown of Selected Product Service Codes by Contract Type

Contract Type	Number	Percentage
Fixed-price	987	45.69%
Cost-reimbursement	868	40.18%
Time-and-material (T&M)	275	12.73%
Labor hour (LH)	30	1.38%

To analyze the data in-depth and answer research questions such as outcomes of these contracts in terms of deliverables and cost drivers, we extracted a sample of 100 contracts along with their SOWs, statements of objectives (SOOs), or the PWSs, evenly divided into the five categories based on the highest amount of spend. The 100 selected contracts in the five PSCs accounted for 22.17% of the spending in the five categories. The amount spent on the 20 selected contracts in each category, vis-à-vis the total spend in that particular category, is given in Table 6 (see Chapter III).

The FAR highlights the essentiality of a precisely written SOW for sound contracting and to negotiate a fair price for the contracted service (DoD, 1996).

According to DoD's Guidebook for the acquisition of services, "the PWS comprises the 'heart' of any service acquisition and the success or failure of a contract is greatly dependent on the quality of the PWS" (2011, p. 32). The task of writing SOWs, SOOs, and PWSs becomes more important for knowledge-based service contracts; however, it is cumbersome because it often requires a combination of tacit and implicit knowledge of the subject.

In order to define requirements precisely, it is important to have a clear understanding of the deliverables, or outcomes, contracted for in knowledge-based service contracts. The OUSD memorandum, *Taxonomy for the Acquisition of Services*, stressed the need to achieve affordability by clearly organizing all the services acquired into six categories as per the PSC manual (OUSD, 2010b). It is essential to have a taxonomy not only for the services, but also for the deliverables of the services in order to have a clear and comprehensive understanding of what the USAF procures. While contracting for services, an outcome focus is needed to derive cost savings/avoidance techniques. Contracting for knowledge-based services based on titles / PSCs and not accounting for the type of deliverables required will have an effect on the type of contract used to procure the knowledge-based services. The selected 100 contracts showed a substantial variety of deliverables, either tangible or intangible. Some of the tangible deliverables were in-plant technical support, facility and equipment management, vehicle management and maintenance, etc. Intangible deliverables included workforce training, advisory services, technical support through telephone or e-mail, and assistance in source selection. Although information processing is an intangible action, its output can easily be transformed into a tangible form such as technical reports, studies, analyses and evaluation, presentations, briefings, information papers, graphics, etc.

At present, there is no taxonomy in the DoD or USAF by which to categorize these deliverables. While most of the contracted deliverables directly relate to the titles, or labels, of categories (e.g., PSC codes) of services procured, making judgments based on categories alone can obfuscate understanding of

what exactly is being procured. For example, a consulting knowledge-based service may be classified as a management/professional service. Without having a precisely defined deliverable, this type of requirement may end up as a T&M contract. In this case the outcome is the expertise, experience, knowledge of individuals who are on site and are available as needed. Hence, by understanding the difference between a title/label and an outcome, the contracting officer could contract for a scoped report or analysis that could be done mostly off site and perhaps could be priced as a FFP-type contract rather than T&M.

In an effort to categorize the deliverables of knowledge-based services of our selected PSCs, we examined multiple taxonomies and decided to divide the deliverables as per Lovelock and Wirtz 'Four Categories of Services' model (2007, p. 34). The model was selected because most of the deliverables in knowledge-based services are intangible and this model gives a lot of emphasis on nature of the service act. The categories in 'Four Categories of Services' model is referred to as "people processing, possession processing, mental stimulus processing and information processing" (Lovelock and Wirtz, 2007, p. 34). People processing and possession processing services are tangible actions directed towards people's bodies and physical possessions, respectively (Lovelock and Wirtz, 2007). Whereas mental stimulus processing and information processing services are intangible actions directed at people's minds (Lovelock and Wirtz, 2007). Based on the 'Four Categories of Services' model, Table 11 depicts a proposed taxonomy of some deliverables from our selected five PSCs.

Table 11. Taxonomy for Deliverables (After Lovelock and Wirtz, 2007)

What is the nature of the service	Who or What Is the Direct Recipient of the Service?	
	People	Possessions
Tangible Actions	1. People processing (services directed at people's bodies): Recreational services, Cargo movement training	2. Possession processing (services directed at physical possessions): Evaluation of engineering/technical issues, In-plant technical support, Weapon system engineering and technical support, Undertaking system engineering and integration, Facility and equipment management, Vehicle management and maintenance, Fuels management, Cargo movement, Computer networking, Maintenance services, Contractor-Inventory Control Point (C-ICP) management, Programmed Depot Maintenance
Intangible Actions	3. Mental stimulus processing (services directed at people's mind): Workforce training, Advisory services, Technical advisory services, Technical support through telephone or e-mail, Preparation of acquisition strategy, Assistance in source selection, Arrangement of guidance conferences for engineering data, Program management plans, Logistics support plans, quality control plans, Configuration management plans, Integrated master plans, Systems engineering management plans, Test and evaluation program plan, Risk management plans, Supply support plans	4. Information processing (services directed at intangible assets): Technical Reports, Studies, Analyses and evaluation, Papers, Updates to technical orders, Status reports, Presentations, Briefings, Information papers, Graphics, Investigation and resolution of anomalies, Hardware/software solutions, IT-related services such as data rights and files in an appropriate format, Qualification testing of software, Modification of database, Delivery and testing of software solutions, Communication services, Network-Centric Information Technology

Additionally, the GAO recently reported in its annual testimony before the budget committee to the U.S. Senate that the government has numerous areas where it needs to reduce fragmented, overlapping, and duplicated contracting efforts (GAO, 2013). These areas present themselves between federal agencies or within the same agency. Over the past three years, the GAO found over 300 actions within 131 areas the government could address to achieve cost savings such as the USAF renegotiating food service contracts at 18 installations (\$2.5 million annual savings), the DoD consolidating defense foreign language support contracts, or the consolidation of support services across 26 joint basing locations (GAO, 2013). If the GAO has identified these broad categories within the government where fragmented, duplicated, and overlapping contract actions exist, there may be opportunity for the USAF to identify fragmented, duplicated, and overlapping contract actions in the purchasing of knowledge-based outcomes or deliverables. A taxonomy of deliverables, similar to Table 11, could help the USAF determine what is actually being purchased as opposed to simply depicting labor in often vague PSC codes and description fields in FPDS-NG.

The analysis of the selected 100 contracts also revealed that every buying office is involved in the acquisition of a varying range of service types. For instance, the buying office FA0021 at Air Force Special Operations Command (AFSOC) contracted 42 original contracts in eight different PSCs, as given in Table 12.

Table 12. Breakdown of Selected Air Force Special Operations Command Contracts by Contract Type

PSC	Description	Number of Contracts	Obligation (\$)
5805	Telephone and Telegraph Equipment	1	111,366
5820	Radio and Television Communication Equipment, Except Airborne	1	47,475
5895	Miscellaneous Communication Equipment	1	138,242
5985	Antennas, Waveguides, and Related Equipment	1	60,738
6350	Miscellaneous Alarm, Signal and Security Detection Systems	1	31,048
8340	Tents and Tarpaulins	1	2,071,362
J016	Maintenance, Repair and Rebuilding of Aircraft Components and Accessories	1	60,000
R408	Program Management/Support Services	35	12,537,783

The data in Table 12 highlights that the AFSOC buying office's core contracting specialty is Program Management/Support Services (R408), which constituted 83.33% of the total original contract actions. However, the remaining 16.66% of the contracts fell in seven different PSCs. Consolidation of these contracts, if feasible, with another appropriate buying office having their core competency in those specialties, could result in significant savings. The USAF has successfully used the concept of commodity councils for acquiring supplies. Members of cross-functional commodity councils have deep category expertise. They know the services they buy, their cost drivers, the best-in-class suppliers, and the current market conditions. They can eliminate the duplication of effort, demonstrate savings through leverage purchasing, and increase the quality of goods and services (DoD, 2004). Decentralized sourcing coupled with the shortage in acquisition workforce also means that inexperienced workers are

involved in the procurement of services. This workforce is learning through repeatedly committing mistakes at the cost of the tax payers' dollars. In order to address the skills and competencies of the contracting workforce, DoD has made a competency model (GAO, 2007b). Apart from transactional cost savings, consolidation of two knowledge-based contracts to a single geographical location where the cost of labor is comparatively less could result in substantial savings. During the 13th ISM conference, Dr. Silvia Hodges and Marty Harlow highlighted outsourcing of legal services to a region where the cost of consulting was cheaper as an example of realizing benefits from this approach. Consolidating services, not tied to a geographic location, coupled with flat fees and personnel with appropriate experience, could save the USAF money.

The SOW of the selected 100 contract actions highlights that obligations were comprised of multiple contract line item numbers (CLINs) pertaining to different PSCs within a single contract action. However, the FPDS-NG spend data recorded the obligation against a single PSC, usually according to the highest dollar-value CLIN. Because many different types of services (PSCs) are often included in the same contract and coded under a single PSC, the FPDS-NG obligation data distorts the true dollar values spent in each service category. The impact of this anomaly magnifies for an agency like the USAF, which had 147,222 contract actions in FY2010.

The sample data also showed that several legal statutes, including the Economy Act, Services Contract Act, and Walsh Healy Act, bound 60% of the contracts. Although the Walsh Healy Act applies to the acquisition of supplies, our sample data revealed 31% of the original knowledge-based services contracts fell under this act. The presence of this act in knowledge-based service contracts depicts supplies purchased under a knowledge-based service contract. Purchasing supplies within a services contract may deny the USAF leverage in spending it could achieve through the appropriate commodity council. This highlights a limitation in the contracting system whereby the contracting officer is bound to record a multiple CLIN contract under a single PSC. Thus, anyone examining the data may not be able to discern what the USAF bought without opening the actual contract or SOW.

C. ANALYSIS OF QUALITATIVE DATA

The purpose of this study was to explore whether and how the USAF could improve efficiency in sourcing knowledge-based services by instituting for-profit sector best practices in strategic sourcing. To address the purpose of this research, our research team conducted a literature review and multiple interviews with subject-matter experts to identify best practices used in the for-profit and not-for-profit sectors. Our literature review identified 22 best practices of strategic sourcing used in a CAPS Research project examining 119 for-profit sector organizations (Monczka & Peterson, 2011). Additionally, the GAO (2002) identified four basic best practices applied to six for-profit sector firms that resulted in substantial savings and many service improvements. Finally, our interviews identified seven best practices the for-profit sector informants currently utilize to acquire knowledge-based services.

Our team solicited 99 participants in support of this research project. We contacted every acquisition professional via e-mail or telephone resulting in 11 interviews over a three-month period. Despite the lack of participation and lengthy questionnaire, our team achieved an 11% participation rate, which is within the 10–15% average external survey participation rate (Sacks, 2010). Table 13 depicts the participation rates, method of interview, and sector from the four methods of soliciting participants.

Table 13. Interview Participant Results

Method of Soliciting Interview Participation	Number of Personnel Solicited	Number of Personnel Interviewed	Percentage of Personnel Interviewed	E-mail Interview	Telephone Interview	For-Profit Sector	Not-for-Profit Sector
13th Annual ISM Services Conference	42	3	7%	1	2	2	1
Naval Postgraduate School Faculty	3	1	33%	1	0	0	1
CAPS Research Affiliates	44	4	9%	3	1	4	0
Not-for-Profit Social Network	9	2	22%	1	1	0	2
For-Profit Social Network	1	1	100%	0	1	1	0
Total	99	11	11%	6	5	7	4

Because our spend analysis focused on five PSCs within the knowledge-based services category, it was important to interview at least one person from the for-profit sector and one person from the not-for-profit sector for each respective PSC. Representation of an interviewee from almost every PSC enabled us to correlate the interview data to the spend data to answer our research questions and to support our recommendations within each category. Table 14 reflects the interview participants within each respective PSC.

Table 14. Interview Participants by Product Service Code

Product Service Code	Description	For-Profit Sector	Not-for-Profit Sector
R408	Program Management/Support Services	Food Production and Distribution Company	
R414	Systems Engineering Services	Petroleum Management Company	Department of Energy
		Food Production and Distribution Company	Department of the Army
		Global Engineering Company	
R425	Engineering and Technical Services	Petroleum Management Company	Department of Energy
		Food Production and Distribution Company	Department of the Army
		Global Engineering Company	
R706	Logistics Support Services	Global Engineering Company	NPS Faculty
		Domestic and International Relocation Company	
		Global Payment Processing Company	
		Assisted Living Services Company	
R707	Contract, Procurement, and Acquisition Support Services	Acquisition Learning Solutions Company	Department of the Army

1. Interview Best Practices

Implementing best practices with respect to purchasing knowledge-based services is different for each firm. In order to gain insight into some of the best

practices the for-profit sector is currently using, we included an open-ended interview question that allowed the for-profit sector informants an opportunity to explain the best practices they were currently using. Although not all inclusive of what the for-profit sector is utilizing when it comes to the procurement of services, our results revealed seven best practices discussed later in this chapter under Section D (Answers to Research Questions):

- a. conducting spend analysis,
- b. demand management,
- c. contract consolidation,
- d. use of preferred partners,
- e. electronic reverse auctioning,
- f. cost containment, and
- g. e-sourcing.

2. Constraints in Implementation of Tenets/Best Practices

As with any major decision that organizations face, there are usually constraints that prevent or limit the outcome. Both the for-profit and not-for-profit sectors face many constraints when it comes to the procurement of services. During our interviews, the for-profit sector informants identified multiple constraints they face when it comes to purchasing services:

1. Internal departments within an organization must compete for limited resources to source requirements.
2. Internal departments are not using their procurement departments to source services.
3. Organizations must deal with last-minute emergency requirements or lack of planning.
4. Organizations must manage services within condensed workweeks where they have only about 30 of 52 full weeks of usable time.
5. The organization has monetary policies on how money is spent
6. The organization has budgetary constraints.

Although some of the above constraints fall within the not-for-profit sector constraints as well, the not-for-profit sector faces additional constraints that do not pertain to the for-profit sector:

1. The Competition in Contracting Act (CICA): 41 U.S.C. 253 is a public law enacted for the purpose of encouraging competition for awarding all government contracts by increasing the number of competitors and realizing cost savings through lower, more competitive pricing. It requires full and open competition for contracts unless exempt, as per FAR part 6.
2. The FAR: unified policies and procedures for procurement that all executive agencies must follow.
3. Bid protests: legal process in which an interested party may contest the procedure or outcome of a government contract award.
4. Truth in Negotiation Act (TINA): requirement for contractors to submit certified cost and pricing data for negotiated procurements above \$750,000.
5. Other federal and department regulations/policies/directives.
6. Socioeconomic set-asides: requirements to set-aside a certain percentage of contracts for award to small business concerns.
7. Buy America Act: preferred use of U.S. made products in procurements.
8. Berry Amendment: preferred use of domestically produced, manufactured, or home-grown products.
9. Fiscal law (time, purpose, amount): requirement to purchase only for appropriated amount, within the allotted time, and must be a bona fide need.
10. Oversight: regulations/policies/directives require additional personnel to manage contracts from requirement through closeout.

3. Management of Knowledge-Based Service Contracts

As noted in the literature review, both the for-profit and not-for-profit sectors have increased the use of knowledge-based service contracts. The increased use of knowledge-based services is causing a shortage of knowledge-based workers. The McKinsey Global Institute predicts that there will be a 13% shortage in demand by 2020 (Dewhurst et al., 2013). Although outsourcing knowledge-based services can save money and fill capability gaps, it can also cause an organization to lose valuable tacit knowledge if not captured from the personnel who are performing those knowledge-based services. Our interviews revealed that eight of 11 interviewees from the for-profit sector and not-for-profit sector track the spending of knowledge-based services. Only one of seven for-profit sector interviewees has an online IT knowledge system to retain procured tacit knowledge, whereas none of the not-for-profit sector interviewees has an IT system used to store and organize procured tacit knowledge. The only knowledge captured by all the interviewees is in the form of SOWs, PWSs, SOOs, standard operating procedures (SOPs), processes, policies, or training.

Although not necessarily the contracting officer's job to retain tacit knowledge used in the performance of knowledge-based service contracts, knowledge loss created by outsourcing may have serious implications. For example, the Australian Navy blamed its government for policy changes, the downsizing of uniformed personnel, and the excessive outsourcing, which resulted in the loss of knowledge-based skills (Bushnell, 2011). This has been identified as contributing factors as to why three supply ships were unable to perform a recovery mission after a cyclone (Bushnell, 2011). Another example stems from a Fortune 500 company who dismissed a bookkeeper earning \$9 an hour (Massingham, 2008). Since the company failed to document the tacit and explicit knowledge the bookkeeper used on a daily basis, they were unable to answer important questions which resulted in hiring the bookkeeper back as a consultant at \$42 an hour (Massingham, 2008). This net loss of \$33 an hour countered the cost saving measures the Fortune 500 company was trying to

accomplish by downsizing. The USAF must ensure that it is retaining competency in all areas of knowledge-based spending, whether to perform the task organically or the ability to manage and perform the outsourced task. If the USAF must insource a previously outsourced knowledge-based service but fails to retain the tacit knowledge, then the USAF may find itself struggling to perform knowledge-based services.

D. ANSWERS TO RESEARCH QUESTIONS

Although knowledge-based services are only one of the six types of services, they account for a major portion of service spending and provide a substantial opportunity for cost savings. This is evident from the fact that DoD spending on knowledge-based services is steadily increasing. Between FY2005 and FY2011, the DoD increased the use of knowledge-based services from \$28.3 billion to \$45.2 billion (DPAP, 2012; GAO, 2007a). Knowledge-based services constitute a vast portion within PAMS, as categorized by the CSIS (Berteau et al., 2012). The FY2010 USAF spend data showed an obligation of \$9.7 billion on knowledge-based services, which is 37.82% of total spending on acquisition of services (FPDS-NG, 2010).

During this time of financial constraints after the materialization of sequestration, the DoD must use the obligated dollars in the most efficient manner. Due to the peculiar characteristics of the services, the DoD is unable to quantify the output of services in terms of their contribution to the overall mission. Knowledge-based services are a major part of the total services that the DoD has acquired; however, the DoD is currently unable to determine how much savings can be attained in this area. Despite evolving DoD policies, there is currently no cost-saving/avoidance framework or set of best practices for knowledge-based service contracts. We developed eight research questions (RQs) with the purpose of identifying for-profit-sector best practices and original ideas that the USAF could implement in the strategic sourcing of knowledge-based service contracts. The eight research questions and respective results are listed below.

RQ 1. What are the relevant tenets of strategic sourcing?

Although the USAF has already implemented some of the 22 CAPS Research and four GAO tenets of strategic sourcing, our team focused on 11 relevant tenets that the USAF could work on to enhance its strategic sourcing of services. The most widely utilized tenet of strategic sourcing begins with conducting a spend analysis of which all other tenets flow and is the beginning and the end to the seven-step strategic sourcing process. Additionally, eight of 11 interviewees track the spend within their organization. We explained all 22 CAPS Research and four GAO tenets in detail in the literature review:

1. Knowledge of Service Spending (Spend Analysis): Organizations that want to gain or maintain a competitive advantage must understand how they are spending their money. Conducting a spend analysis allows an organization to collect, classify, and analyze their expenditure data in order to reduce procurement costs and improve efficiency while maintaining effectiveness. Many organizations do not conduct spend analyses because they do not have spend data readily available or because it takes too long to retrieve the data. The interviewee from the global engineering company “employs a spend analysis tool and data cleansing service that take the spend from multiple different systems and normalize the spend for analysis” (Procurement officer, personal communication, March 5, 2013). In a 2004 GAO report, the Department of Veterans Affairs realized a \$394 million cost reduction in pharmaceutical procurement in one year after conducting a spend analysis. In 2003, the state of Georgia used spend analysis to identify inefficiencies to help resolve a \$600 million deficit (Pennington, 2011). By implementing an enterprise-wide approach to shared administrative services like procurement, fleet management, and risk management, the state of Georgia was able to realize an annual cost savings of over \$100 million

(Pennington, 2011). The USAF currently utilizes spend analysis as a cost savings measure; however, lack of human resources and inaccurate or incomplete data make it difficult for all buying offices within the USAF to utilize spend analysis to its full potential.

Recently, a team from the USAF knowledge-based service council tried to use spend data to determine deliverables based on PSCs but found it difficult because they had to open every contract to determine the deliverables; and even then, the PWS often depicted undefined requirements (Director of the USAF knowledge-based services Council, personal communication, April, 22, 2013).

Additionally, our research team attempted to utilize the spend data to determine the deliverables and cost drivers of 100 contracts and found it difficult to locate deeply embedded data that was often unavailable or unclear. The DoD should create a taxonomy of deliverables associated with all services that would provide a more finite level of detail of what is actually being spent and that is easier to access.

2. Strategic Cost Management: Much like demand management, strategic cost management requires the development of strategies to identify and manage all costs and cost drivers that could be controlled, reduced, or eliminated pertaining to design, quality, inventory, transportation, and disposal costs associated throughout the life cycle of the product or service (Monczka & Peterson, 2011). A careful analysis of these categories could result in the identification of a substitute material or service, consolidation of transportation assets, better inventory management procedures, or a means of recycling that could result in cost savings without sacrificing quality. One interviewee stated, “Whenever we scope a project, we ask if there is a way to get work done with fewer resources or hours. We are sensitive to “over-buying” and seek to

always “right size” any purchase” (Global Strategic Sourcing manager, personnel communication, March 15, 2013). Many educational institutions where instructors provide online interactive classes have realized cost savings by eliminating the physical space required to house students without sacrificing the quality of education. Despite these cost saving measures, the USAF should explore the use of strategic cost management in sourcing knowledge-based services to reduce costs by purchasing defined deliverables instead of labor hours where possible. Additionally, the USAF should look at all levels of its spend data because organizations tend to focus on the largest categories of spend when implementing strategic cost management; however, the best cost saving opportunities often result from the smaller categories of spend (ATKearney, 2003). The USAF should apply demand management levers such as eliminating demand, reducing quantity, simplifying specifications, reducing frequency, encouraging substitution, imposing tighter process and tracking, increasing cost awareness, and tightening policies (ATKearny, 2003).

3. Human Resource Development: Organizations must figure out how to attract, acquire, train, develop, and retain acquisition personnel in order to preserve the tacit knowledge and competitive advantage. Keeping the right balance of knowledge-based workers can be a challenge if resources are unavailable. Leaders must be flexible to the needs of the ever-changing and dynamic workforce. One study suggests flexible hours, hiring a mixture of part-time and full-time employees, allowing for remote workers, commissions, bonuses, and vacation benefits to aid in the retention of knowledge-based workers (Lund et al., 2012). Another study suggests cross-training, mentoring programs, exiting checklists, healthcare packages, generous salaries for part-time employees, and the flexibility for

retirees to be hired as consultants, mentors, and trainers of new employees to help balance the workforce (Krumrie & Lynch, 2006). The USAF is currently facing a loss of potential knowledge and experience in its civil service acquisition workforce due to the workforce reduction at the end of the Cold War and current hiring freeze. The USAF should create a pilot program that allows its leaders the flexibility to develop and tailor retention plans based on suggestions and innovative ideas from current leadership and the above-mentioned studies. Failure to retain knowledge workers or their tacit knowledge may result in new employees using up valuable resources to exploit the previously lost tacit knowledge.

4. Total Cost of Ownership: Much like strategic cost management, TCO allows an organization to identify the relevant costs and cost drivers of buying a product or service from a supplier (Ellram & Siferd, 1998). TCO includes all direct and indirect costs incurred throughout the life cycle of an item, comprising research and development, procurement, operations and maintenance, and disposal (Monczka & Peterson, 2011). Proper TCO analysis could help to identify and eliminate costs not associated with the final product, such as calculating the cost of crewmembers into the total cost of a replacement aircraft because these crewmembers are not managing the research, development, operations, maintenance, or disposal of the aircraft. One issue the USAF has in conducting a proper TCO analysis is that it does not account for all the government personnel costs associated with acquisition and procurement, operations and maintenance, and disposition. The USAF should begin utilizing proper TCO analysis by including the contracting overhead costs related to transaction costs of all acquisitions in order to justify the need for an increased workforce.

Additionally TCO will help in identifying the true cost of managing a program/contract from requirement development to disposal.

5. **Supplier Assessment, Measurement, and Communications:**
Organizations should develop metrics to evaluate a supplier's performance, strategies, and processes to gauge performance against specified objectives (Monczka & Peterson, 2011).
Presenting clearly defined performance metrics up front to a supplier can reduce the risk of sub-standard performance. One for-profit interviewee who works for a food production and distribution company developed a monthly scorecard to track the key performance indicators by location regarding the varying levels of water services, energy services, chemical services, pest services, and sanitation services. Another for-profit interviewee who works for an assisted living company uses a quarterly vendor review to track current clientele, sales, and subjective questions like what value the vendor is bringing to the organization, how the vendor is going to maintain its relationship with the organization, and what its IT infrastructure can support. Both interviewees perform these evaluations face to face with the contractor so that issues on behalf of the organization and the contractor can be resolved quickly with little interference of day-to-day operations. The USAF already uses metrics such as performance evaluations and quality assurance surveillance plans to track knowledge-based services that are monitored by contracting officer representatives (COR); however, lack of training, time, technical expertise, and oversight often allows contractors to complete substandard services (GAO, 2012a) undetected. The USAF should consider making CORs a permanent position instead of a secondary job so that they can dedicate their efforts solely to conducting evaluations and providing feedback to the contractor in order to eliminate the waste of time and money due

to incomplete or substandard work. Although these permanent COR positions may increase personnel costs, properly implemented performance metrics can lead to increased efficiencies while still maintaining effectiveness.

6. Cross-Functional/Location Teaming: Before making large or complex purchasing decisions, an organization should attempt to gather expert personnel from across appropriate departments to work in tandem to develop purchasing strategies (Monczka & Peterson, 2011). One interviewee stated, "When a category is sourced for the first time, we do extensive research into our supplier database to determine where all of the usage is currently occurring. This allows us to coordinate all the key users of the services and leverage the spend across the company" (Global Strategic Sourcing manager, personal communication, March 15, 2013). The USAF uses integrated product and process development (IPPD) teams to gather the correct personnel in the planning and purchasing of major acquisitions such as aircraft, weapon systems, and satellite programs. Additionally, the USAF developed commodity councils for commodities and services that are purchased by many activities across the entire department to aid in strategic sourcing. Without these strategies, many major acquisitions may not be as efficient and effective due to wasted time, human capital, and overhead costs associated with the learning process. The USAF should continue to utilize teaming with internal buying offices as well as other DoD buying offices to collaborate and develop strategies for the procurement of knowledge-based services. Additionally, the Under Secretary of Defense directed each component to establish a senior service manager responsible for planning, execution, strategic sourcing, and management of service contracts (Kendall, 2013).

7. **Supplier Integration into New Product/Process/Service Development:** An organization can help eliminate wasted resources up front and strengthen the supplier/buyer relationship. The DoD encourages the use of performance-based specifications where the supplier develops a requirement from the government without the government telling the supplier exactly how to develop the requirement. Supplier integration into development provides suppliers with the opportunity to display their innovative ideas for bringing a product or service to fruition. Supplier involvement in the development phase of a product or service can increase quality, reduce purchase costs and total lifecycle costs, and improve product- or service-to-market time (McGinnis & Vallopra, 1999). The USAF utilizes this approach in over 10 of its major acquisition programs such as the Globemaster III Advanced Cargo Aircraft (C-17A) and the B-2 Radar Modernization Program as well as over 25 joint major acquisition programs. The USAF could also implement a similar approach like the Army's Network Integration Evaluations where the for-profit and not-for-profit sectors bring together contracted technology and services for testing by the soldier. This approach allows the for-profit industry participants to see how commercial items are integrated into the military. Additionally, the for-profit participants may identify improvements, new technology, and service requirements.
8. **Standardization of Products, Services, Components, and Design Specifications:** Standardizing common knowledge-based services and collaborating with other buying offices can help to realize cost savings. Automobile manufacturers standardize maintenance service packages to support the manufacturer's warranties and alleviate dealer inconsistencies. The USAF takes advantage of standardization by purchasing standardized cellular phone packages

across the entire continental United States. Although it is easy to standardize service in certain categories, knowledge-based services may prove to be a challenge. Currently, the USAF is developing a framework to categorize similar knowledge-based services for basic installation services but has found it difficult due to the lack of adequate spend data and undefined requirements within the SOWs. The USAF should consider developing a standardized taxonomy of outcomes and deliverables associated with all purchased knowledge-based services – similar to the taxonomy provided herein. This taxonomy could help the USAF eliminate the practice of purchasing labor hours for undefined knowledge-based services by purchasing defined knowledge-based deliverables such as market research, past performance inquiry, contract close-out, auditing, cost & pricing analysis, and editing services.

9. Enabled Success through Sustained Leadership, Communication, and Metrics: A 2002 GAO report indicated the lack of top management buy-in as the root of many restructuring failures. Additionally, Georgia state officials realized that they needed to get involved in their restructuring process when employees could not provide adequate solutions to their customers' feedback (Pennington, 2011). Because most organizations have such a diverse workforce with different backgrounds, interests, ethnicity, tenure, and value systems, it is imperative for organizations to have top leadership engagement at all times, open lines of communication, and constant follow-up on strategies for strategic sourcing of knowledge-based services. The USAF not only faces these challenges, but must also cope with the turnover of civilian, military, and contract employees who are constantly moving from one position to another for career progression. The USAF already conducts employee evaluations, training, and integration programs

to ensure that all employees understand their role within the organization. However, the USAF should capitalize on the knowledge and innovation of its workforce by developing an incentive program. The program should not only reward employees for implementing leadership policies and procedures, but also challenge them to go beyond to seek out better ways to gain efficiencies while still being effective when contracting for knowledge-based services. The USAF leadership is currently supporting an initiative at Wright Patterson Air Force Base to effectively source installation-level knowledge-based services to eliminate buying undefined labor requirements and replace them with deliverables. Although this new program may be a great accomplishment, it will not survive if leadership does not understand it, enforce it, and engage with the workforce that must use it.

10. Strategic Insourcing/Outsourcing (Make or Buy): Before organizations make any purchasing decisions, they should “evaluate internal capabilities, competencies, and capacity verses external sources and capabilities to identify opportunities to better focus on core competencies, improve product/service differentiation, and develop and sustain competitive advantage” (Monczka & Peterson, 2011). Organizations that wish to outsource should ensure that they retain the knowledge of the position they are outsourcing, as well as understand how to manage the outsourced position. One for-profit interviewee stated, “We always compare the cost of insourcing verses outsourcing when we are determining a sourcing strategy for services” (Global Strategic Sourcing manager, personal communication, March 15, 2013). Another for-profit interviewee stated, “It depends on the specific services and application on a project or with the corporate entity. The method is not characterized by preference” (Procurement officer, personal communication,

March 5, 2013). The USAF adds an additional step in this make-or-buy decision where they must also ensure that they do not outsource positions that are inherently governmental. The USAF should take time to analyze the price of a federal employee vis-à-vis the cost of outsourcing and managing that employee because the federal employee can often be more flexible and require less oversight (Project on Government Oversight [POGO], 2013). In 2011, POGO conducted a cost benefit analysis between federal and contract employees in 35 employment categories (2013). Their results revealed that on average, a contract employee earns 1.83 times more in total compensation as opposed to a federal employee and in 33 of the 35 categories the federal employees were less expensive (POGO, 2013). Table 15 depicts knowledge-based services that POGO analyzed that were closely associated with the five PSCs we analyzed in this research. Out of these knowledge-based services, a contractor earns on average 1.76 times more than a federal employee. In light of sequestration, the DoD should force every requiring activity to scrub 100% of contracts in knowledge-based services and report: how it contributes to mission, how long it has lasted and will last, and alternatives for getting the same/similar result with less money, then build in incentives to reduce (e.g., more manning or more budget next year) this spend.

Table 15. Cost Analysis of Federal vs. Contractor Employee Compensation
(After POGO, 2013)

Job Description	Full Federal Annual Compensation	Contractor Annual Billing Rates	Contractor vs. Federal Compensation
Computer Engineering	\$ 136,456	\$ 268,653	1.97
Contracting	\$ 113,319	\$ 259,106	2.29
Logistics Management	\$ 116,147	\$ 168,938	1.46
Mechanical Engineering	\$ 126,177	\$ 189,197	1.50
Program Management	\$ 173,551	\$ 269,901	1.56
Average	\$ 133,130	\$ 231,159	1.76

11. Collaborative Buyer/Supplier Development and Continuous Improvement. An organization can build a supplier alliance by collaborating and developing the supply network and constantly seeking improvement (Monczka & Peterson, 2011). Organizations should continuously use metrics to improve not only their own processes and procedures, but that of their suppliers as well. Developing joint relationships highlights improvements, joint resources, and the sharing of risks and rewards (Monczka & Peterson, 2011). Taking the time to develop a supplier can be beneficial in the long term but may also pay off in the short term if an organization needs something expedited. One of the for-profit interviewees uses his quarterly vendor reviews as a way of providing feedback to the supplier as well as soliciting feedback as a means of collaborative development. The USAF could use this strategy to post a well-known, currently sole source, knowledge-based service requirement for future awards well in advance so that the supply base could prepare for the requirement. Commodity councils should advertise such requirements and be required to include strategies or

efforts taken 12 months out from the need to thwart a sole source monopoly. This approach could spark competition and ultimately produce cost savings.

RQ 2. What are commercial best practices in sourcing knowledge-based services?

Many organizations are constantly looking for ways to improve the bottom line or get the best value for their money, and because each organization's focus is different, there are multiple commercial best practices in relation to the procurement of knowledge-based services. Although not all-inclusive, our interviews resulted in seven for-profit sector best practices:

1. Conducting Spend Analysis: The first best practice identified during the for-profit sector interviews requires an organization to conduct a spend analysis. For an organization to determine inefficiencies in their procurement processes, they must be able to understand how they are spending their money. A proper spend analysis highlights redundancies for elimination and/or consolidation. Many organizations do not conduct spend analyses because they do not have spend data readily available or because it takes too long to retrieve the data. The interviewee from the global engineering company "employs a spend analysis tool and data cleansing service that take the spend from multiple different systems and normalize the spend for analysis" (Procurement officer, personal communication, March 5, 2013). In a 2004 GAO report, the Department of Veterans Affairs realized a \$394 million cost reduction in pharmaceutical procurement in one year after conducting a spend analysis. The USAF had approximately 125 employees involved in cross-functional strategic sourcing to leverage spend across 71 sites (GAO, 2012c). The USAF currently utilizes spend analysis as a cost savings measure; however, lack of human resources and inaccurate and incomplete data make it

difficult for all buying offices within the USAF to utilize spend analysis to its full potential. Recently, a team from the USAF knowledge-based service council tried to use spend data to determine deliverables based on PSCs but found it difficult because they had to open every contract to determine the deliverables, and even then, the PWS often depicted undefined requirements (Director of the USAF knowledge-based services Council, personal communication, April, 22, 2013).

2. Demand Management: Although a spend analysis can reduce costs by identifying opportunities to consolidate contracts and eliminate redundancies, demand management goes one step further and looks at the consumption. Demand management requires an organization to look at the commodities and services they are consuming to determine what they can reduce, eliminate, or substitute. One of the for-profit interviewees conducts a meeting every Monday with all managers to review the previous week's accomplishments. He stated, "My main job is to look at Excel spreadsheets and forecast what services we need to be ready to manage internally and how many new vendors we need to manage externally" (Executive director, personal communication, February 14, 2013). Another interviewee stated, "Whenever we scope a project, we ask if there is a way to get work done with fewer resources or hours. We also look at standardization as a way to reduce the risk of overbuying or driving the price up. We are sensitive to 'over-buying' and seek to always 'right size' any purchase" (Global Strategic Sourcing manager, personnel communication, March 15, 2013). Another for-profit organization used demand management to reduce travel expenditures by requiring a 14-day booking notice, restricting travelers to economy hotels, booking through an online system, and even replacing

unnecessary travel with video teleconferencing (ATKearney, 2003). Sequestration recently forced the NPS students and faculty to reduce the number of personnel travelling, restricted conferences, and required researchers to find alternatives for participating in events. The USAF used demand management to reduce product costs and associated maintenance services by replacing existing incandescent airfield lighting with light-emitting diode lighting (Quinter, 2012). Additionally, the USAF used demand management to standardize specifications and service levels for the custodial, grounds maintenance, and solid waste management to ensure that all installations receive the same level of services within budgetary constraints (Armstrong, 2008). Despite these cost-saving measures, the USAF should explore the use of demand management in sourcing knowledge-based services to reduce cost by purchasing deliverables instead of labor hours for undefined requirements. Additionally, the USAF should look at all levels of its spend data because organizations tend to focus on the largest categories of spend when implementing demand management; however, the best cost-saving opportunities often result from the smaller categories of spend (ATKearney, 2003).

3. **Contract Consolidation:** Many organizations have multiple buying offices that purchase the same services at different locations. Additionally, organizations inadvertently use multiple contracts for the same service. Organizations that consolidate multiple contracts within the same buying office or across multiple buying offices can avoid transaction costs (e.g., source selection effort and associated procurement lead-time, payment processing, closeouts, etc.) and often obtain a lower price from economies of scale. The USAF, as well as other DoD components, already uses BPAs and IDIQ contracts to eliminate redundancies caused by multiple contracts for

the same item. Despite these efforts, there are still many opportunities for the USAF to consolidate service contracts within and across contracting offices. Although centrally located, our FY2010 spend analysis revealed that multiple buying offices at Wright–Patterson Air Force Base were purchasing knowledge-based services within the same PSC. Contract consolidation among these multiple buying offices could potentially reduce contractor transaction costs associated with multiple contracts. Additionally, the development of a taxonomy of common deliverables for each PSC could allow for the consolidation of deliverables for services, such as legal that include court reporting, legal records collection, and discovery. While at the 13th ISM conference, Dr. Silvia Hodges and Marty Harlow identified geographic location, experience of legal personnel, and the lack of flat rate deliverables as the main cost drivers of legal fees. To combat these cost drivers, Marty Harlow obtained buy-in from his general counsel, began benchmarking best practices, started contracting with other geographically located law firms to obtain a lower prices, and began purchasing deliverables instead of paying by the hour. Consolidating legal services not tied to a geographic location coupled with flat fees and personnel with appropriate experience could save the USAF money.

4. Use of Preferred Partners: Another best practice one for-profit sector informant utilizes is the use of preferred partners when contracting for knowledge-based services such as marketing, advertising, and IT services. This for-profit organization begins with developing confidentiality agreements, followed by the use of a vendor qualification document. The vendor qualification document consists of the Dun & Bradstreet number, current clientele, sales, and subjective questions like what value the vendor is bringing to the organization, how the vendor is going to maintain its relationship

with the for-profit organization, and what the IT infrastructure can support. Through market research, past performance, and the vendor qualification document, the for-profit organization determines three to five qualified vendors to develop knowledge-based service requirements. The qualified vendor documents are then updated every quarter using a four-quadrant worksheet to determine key projects, deliverables, latest industry best practices, performance metrics, and the level of IT system interaction. Over time, the for-profit organization and preferred vendors develop trusting relationships that foster an environment of collaboration that seeks to be innovative and efficient while still being effective. Using qualified vendors in long-term relationships can often keep prices down because suppliers realize cost savings through win-win relationships and learning curves. Although the USAF uses long-term contracts for major defense acquisitions, research and development, and some new construction projects, they are limited to one-year contracts for most services with opportunities for option years. Option years can often keep prices low, but extended contracts can also eliminate suppliers from the industrial base, which could ultimately drive prices up. Additionally, the USAF could use an award term incentive contract that allows the contractor to extend the contract without having to re-compete the contract as often. The USAF must carefully consider the appropriate length and type of contract used to procure services in order to gain efficiencies while being effective and retaining the industrial base. The USAF should examine using an award term incentive contract for sourcing knowledge-based services that would not decimate the industrial base. An award term incentive contract creates an environment for contractors conducive to capital investment and process improvement, promotes their stability, and enables them to reduce

transaction costs over the span of the contract (Stevens & Yoder, 2005). It also affords the government the ability to reduce the risk of protest, time, and transaction costs for the government to continuously compete requirements (Stevens & Yoder, 2005).

5. Electronic Reverse Auctioning (eRA): Another cost-savings measure the for-profit sector uses is eRA. eRA is a bidding process used via the internet that allows suppliers to bid on solicitations in real-time. “Agencies should require the use of eRAs where they are appropriate: for *noncritical* and *leverage* spend where competition is ample, requirements are well defined and few changes are expected, dependence on the supplier is low, and the need to collaborate with the supplier is low” (Hawkins, 2012, p. 33). Hawkins’ research on the use of eRAs by 145 Fortune 500 companies found an average cost savings of 20%; (2012). He also highlighted how the DoD is forgoing at least \$12 billion by not utilizing eRAs (Hawkins, 2012). eRA allows an organization to get the lowest price contract by having suppliers bid against each other in real time. Although this works in some cases, some of our interviewees said that they choose not to use reverse auctioning because often the suppliers bid too low and are unable to complete the contract or the completed work is substandard. Despite the USAF using eRA for commodities and services when feasible, the USAF should determine the appropriateness of using eRAs (Coyne, Hawkins, and Hudgens, 2010). Figure 10 depicts the eRA appropriateness model to determine the amount of competition, how well the requirement is defined, leadership influence, price based selection criteria, type of spend, expected savings and attractiveness (Coyne et al, 2010). Using eRA to source knowledge-based services may not yield much savings due to standardized labor rates and the fact that the USAF does not account for

transactional costs. However, if the USAF develops a taxonomy of common deliverables within the knowledge-based PCs, like market research, past performance inquiry, contract close-out, auditing, cost & pricing analysis, and editing services, they may realize savings through purchasing an outcome instead of purchasing labor.

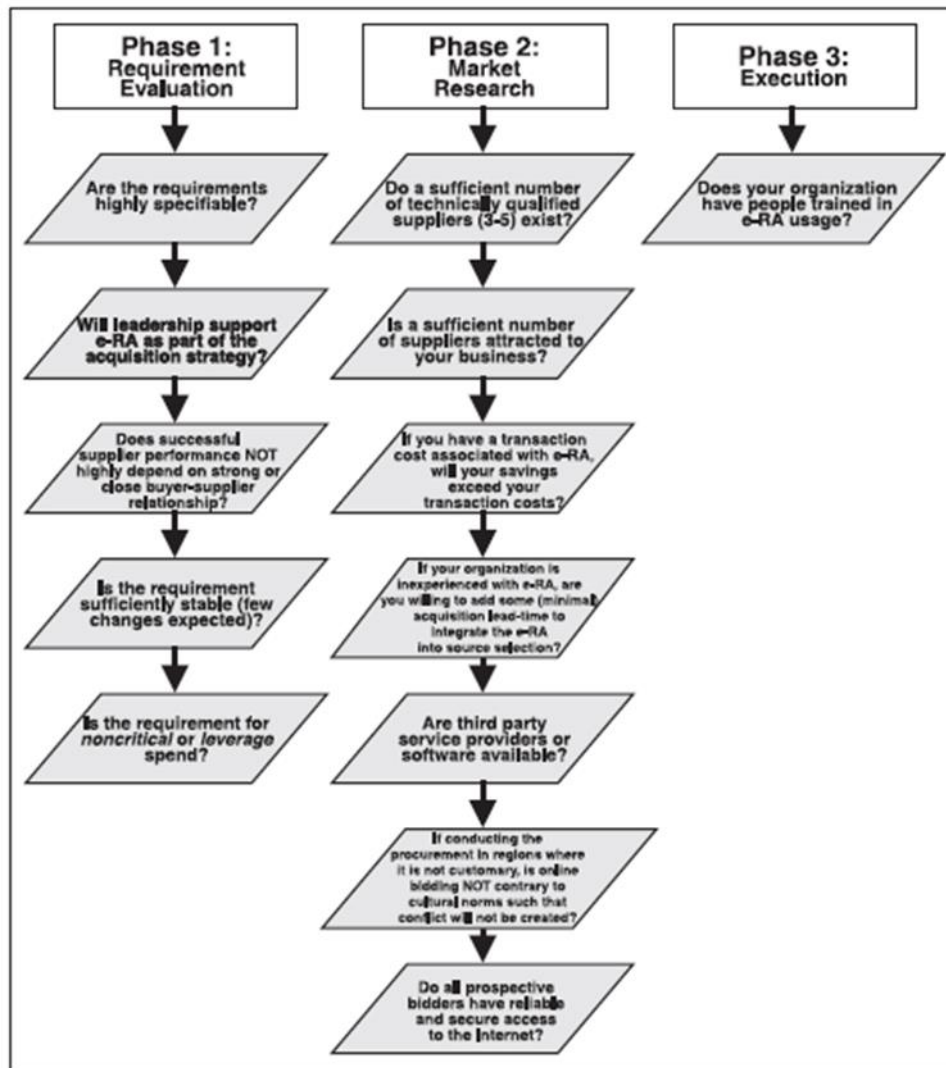


Figure 10. eRA Appropriateness Model (From Coyne et al, 2010)

6. Cost Containment: Also known as strategic cost management identified as one of the 22 tenets of strategic sourcing and similar to demand management, cost containment is another best practice

identified during the for-profit sector interviews. Cost containment is simply finding inefficiencies or cost drivers within an organization, project, program, or contract that can be controlled, substituted, or eliminated without terminating the requirement, such as using video tele-conferencing to reduce travel costs, allowing personnel to work from home to eliminate overhead, or installing sensor lights to reduce energy costs. Cost containment can help reduce the TCO within a program. The USAF constantly uses cost containment in major acquisition programs because both the USAF and the contractor need to hold close to the cost, schedule, and performance measures of the program to avoid a Nun-McCurdy breach and possible program termination. Although the USAF uses cost containment in TCO, it does not account for the government employee costs associated with the contracting process. Not accounting for all direct and indirect costs associated with the cost of contracts does not accurately reflect the true cost of a program or contract. All of our for-profit interviewees account for both contracting and contractor employee expenses associated with the sourcing of services. The not-for-profit sector, specifically the interviewee from the Department of Energy, accounts for both contracting and contractor expenses. One study applied cost containment to waste services. The study identified many cost drivers such as collection frequency, type/amount of trash, distance to landfill, price of fuel, cost of disposal, maintenance of trucks, and labor hours (Hawkins, et al, 2012). By applying cost containment, remedies such as the use of hybrid/electric trucks, automatic side-loading trucks, automatic sorting machines, and a pick-up schedule based on demand where a few of the cost saving measures revealed that would reduce the manpower costs while still providing a service (Hawkins, et al, 2012)

7. E-Sourcing: Another best practice identified from the for-profit sector interviews is the use of e-sourcing. E-sourcing involves a web-based platform used to post requests for information (RFIs), requests for quotes (RFQs), RFP, request for solutions (RFSs), requests for market research, award contracts, conduct contract administration, and contract close-out. E-sourcing can save time, allow for competition, and provides an easy means of communicating requirements from solicitation to payment. The for-profit sector has access to a plethora of e-sourcing programs to include full service online sourcing and spend analyst groups like EC Sourcing, ScanMarket, and Bravo Solution. The USAF, as well as other DoD components, currently uses FBO to advertise RFIs, RFOs, and RFPs. Additionally, the USAF utilizes an online suite called AFWay for a limited variety of supplies. Using E-Sourcing to source knowledge-based services in the USAF can provide electronic information available to all procurement personnel that can be used for future contracts. E-Sourcing can also help with market research to determine how many buyers and suppliers are purchasing the same service. E-Sourcing can also be used to train personnel off-line without corrupting actual data. Finally, E-Sourcing provides spend data; however, since the deliverables under each USAF contract are not coded separately and accounted for within the actual contract, the spend data that comes from the E-Sourcing platform is often inaccurate. Proper coding could allow the USAF to possibly source common deliverables instead of purchasing labor as well as provide accurate data on what the USAF is actually spending as opposed to general categories.

RQ 3. What are the constraints, if any, of applying the commercial best practices in the USAF context?

Constraints can be difficult to overcome in the USAF because many of them result from regulations, policies, or statutes. Three of the four not-for-profit sector interviewees believed the FAR is beneficial, while the remaining one felt the FAR was a hurdle because it makes the procurement of knowledge-based services difficult. The biggest constraint for any best practice is the human resource factor because contracting of any type of service requires continuous oversight. After conducting the interviews and reading literature, our team developed a listing of possible USAF constraints of implementing the for-profit best practices identified from the interviews:

1. Conducting Spend Analysis: Despite the USAF utilizing spend analysis to understand what it is spending its resources on and to determine inefficiencies, its focus is primarily on the broader level of spend data that focuses on contract redundancies for elimination or consolidation. Although the USAF has achieved great success in many areas by using such broad data, it faces an uphill battle in conducting the type of in-depth spend analysis for sourcing knowledge-based services. One constraint our research team as well as a knowledge-bases service team in the Enterprise Sourcing Group discovered is that the spend data available through EDA and FPDS–NG were either inaccurate, incomplete, or lacking the proper attachments. In order to identify the deliverables for a knowledge-based service contract, our team had to open every PWS/SOW of the selected 100 contracts to search for the actual deliverables. This was very time-consuming and often resulted in undefined deliverables within the PWS/SOW. The GAO (2012a) also reported that agencies are still challenged in obtaining and analyzing reliable and detailed agency-wide spend data. Another constraint identified was the use of multiple CLINs within the same contract associated with various contract types like firm-fixed price (FFP), cost plus fixed fee (CPFF), and T&M, despite EDA and FPDS–NG displaying only

one contract type. In order to fully understand and gain true benefits from the spend analysis, all contract types within a contract must be available for analysis through EDA and FPDS–NG. The last constraint identified in fully implementing a thorough spend analysis down to the lowest level is the lack of personnel and time. The USAF could overcome these constraints if it would update the contractual online platforms to accurately reflect all deliverables and contract types, which would reduce the amount of time and resources required to conduct a thorough spend analysis.

2. Demand Management: The USAF can use demand management to look at the commodities and services it is consuming to determine what it can reduce, eliminate, or substitute, but the USAF needs spend data to fully realize savings. Because demand management relies on spend data, the first constraint recognized for properly implementing demand management is the lack of reliable and detailed agency-wide spend data. The second constraint for fully implementing demand management is the lack of training, experience, and workforce. The last constraint is that it challenges an organization's behavior and assumptions by restructuring how services are purchased, creating an environment where cost control becomes the responsibility of every employee (ATKearney, 2003). The USAF can overcome these constraints by fixing the E-Sourcing platforms to reflect accurate spend data. Additionally, the leadership at every level must engage and support an atmosphere of cost control, let go of the perceptions that savings may cause budget decreases, and relinquish control of contracts that could be sourced at a DoD-wide level or reduced, substituted, or eliminated.
3. Contract Consolidation: Although the USAF has been very successful with consolidating commodity contracts and some service contracts, it faces a challenge in consolidating knowledge-

based service contracts. The first constraint in fully implementing contract consolidation for knowledge-based services is the inadequate spend data without clearly defined deliverables and services. The knowledge-based service council at Wright–Patterson Air Force Base found no economies of scale in terms of labor hours for knowledge-based services (Director of the USAF knowledge-based services Council, personal communication, April 22, 2013). Additionally, knowledge-based services are hard to consolidated due to their various and dissimilar outcomes. Another constraint for implementing contract consolidation in knowledge-based services is the socioeconomic set-aside goals that may minimize the amount of small contracts available to consolidate into one large contract. Additionally, many leaders do not like the idea of consolidating contracts with other internal and agency-wide departments for fear of losing control of their contractor, the ability to customize requirements, and reduction in future budget because of cost savings (GAO, 2012c). The last constraint for implementing contract consolidation is the result of the fiscal law statutory requirements in terms of using the appropriated money for the time allotted, for the intended purpose, and for the amount given. The USAF can overcome these constraints by updating their E-Sourcing platforms to reflect accurate and reliable data, as well as create a taxonomy of knowledge-based deliverables under each PSC that would allow for identifications of knowledge-based deliverables that could be consolidated. Additionally, acquisition personnel need to conduct market research and involve the small businesses to determine how to consolidate contracts while maintaining the small business set-aside goals. Moreover, the leadership at every level must engage and support an atmosphere of cost control, let go of the perceptions that savings may cause budget decreases, relinquish control of

contracts that could be sourced at a DoD-wide level, and involve legal representation to determine how to consolidate contract involving possible fiscal issues regarding time, purpose, and amount.

4. Use of Preferred Partners: Although the private sector has the freedom to choose vendors with little resistance, the USAF does not enjoy that freedom when sourcing knowledge-based services. The CICA constrains the USAF from picking preferred vendors due to the mandatory use of full and open competition unless it meets one of the exemptions listed in FAR 6. Additionally, the use of long-term contracts, if awarded to large organizations, could hurt the socioeconomic set-aside goals for small business utilization. The USAF could overcome these constraints by considering the use of an award term incentive contract to develop the long-term partner without having to go through the competition process again. Additionally, acquisition personnel should conduct market research and involve small businesses when developing possible award term incentive contracts.
5. Electronic Reverse Auctioning: Although there are no constraints for the USAF in utilizing eRAs, there is no potential cost savings benefit from using eRAs to source knowledge-based services with established labor rates. The USAF could increase the potential for savings if it develops a taxonomy for knowledge-based services with defined deliverables. Instead of using eRAs to source the knowledge-based service labor contracts, the USAF could source knowledge-based deliverables instead, allowing for potential cost savings. eRAs can be used under simplified acquisition best value trade-off procedures or LPTA (Coyne, 2010).
6. Cost Containment: Cost containment is similar to demand management, except cost containment seeks to reduce, substitute,

or eliminate redundancies within a program, project, or contract without eliminating the requirement. The first constraint recognized for properly implementing cost containment is the lack of reliable and detailed spend data. The second constraint for fully implementing cost containment is the lack of training, experience, and workforce. The last constraint is that it challenges an organization's behavior and assumptions by restructuring how services are purchased, creating an environment where cost control becomes the responsibility of every employee (ATKearney, 2003). The USAF can overcome these constraints by fixing the E-Sourcing platforms to reflect accurate spend data. Additionally, the leadership at every level must engage and support an atmosphere of cost control, ensuring that employees are constantly looking for ways to save money without compromising effectiveness, as well as letting go of the perceptions that savings may cause budget decreases.

7. E-Sourcing: There were no constraints identified for the USAF to fully implement the use of e-sourcing.

RQ 4. What are the different types of knowledge-based services being procured? How much money is spent on these services, with how many different contractors, from how many different buying offices, and through how many different contract actions? How many are with small businesses? How many are sole source? What is the composition by contract type?

The USAF spend data for FY2010 (FPDS-NG, 2010) included 147,222 contract actions with a total spend of \$63.03 billion. The USAF obligated \$25.85 billion out of \$63.03 billion for the purpose of acquiring services, which was 41.02% of the total USAF spend. Out of 147,222 contract actions, 54,448 were initial awards, delivery orders and task orders, accounting for \$22.13 billion, while 92,774 contract actions were modifications to original contracts, accounting for an obligation of \$40.90 billion.

Acquisition of knowledge-based services was a major part of the USAF spend. The USAF is procuring knowledge-based services divided into the following seven categories (OUSD, 2010b):

1. Engineering Management Services: Contractual services such as systems engineering, specifications development, technical assistance, engineering and technical services, simulations, and professional services and technology sharing.
2. Program Management Services: Services related to RDT&E management and support, special studies and analysis, operations research, policy review and development, program evaluation, program management/support, program review/development, and management services/contract and procurement.
3. Logistics Management Services: Support of logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and occasionally security.
4. Management Support Services: Contractual services that provide assistance or advice, for the efficient and effective management and operation your organization.
5. Administrative and Other Services: Material management, courier and messenger support, transcription, mailing and distribution, library services, word processing and typing, stenography, and administrative technical support for conferences and training programs.
6. Professional Services: Contracted services that provide organized, analytical evaluations in support of policy review and development, program management support, operations research, simulation services, specifications development, systems engineering, analyses, or evaluations.
7. Education and Training: Contracted services that provide education and training assistance (DAU, n.d.-b.).

There are a total 218 PSCs in the category of knowledge-based services in the PSC manual that are divided into the above seven categories (OUSD, 2010b). However, in FY2010, the USAF procured services from 126 PSCs within knowledge-based services. There was no expenditure on the remaining 92 PSCs during FY2010. Knowledge-based services accounted for \$9.77 billion, which was 15.5% of the total spend and 37.82% of spend on services. Out of the total spend of \$9.77 billion on knowledge-based services, \$3.59 billion were obligated on initial awards, delivery orders and task orders, whereas remaining \$6.18 billion were obligated towards modifications.

In FY2010, 3,292 contractors were involved in the provision of knowledge-based services to the USAF. Out of these 3,292 contractors, 5.83% of the contractors received 59.64% of the total contract actions for knowledge-based services. However, the other 94.17% of the contractors accounted for rest of the contract actions with an average of 3.55 contracts per contractor.

Out of the total 245 different buying offices that undertook contracts with the USAF in FY2010, 209 buying offices were involved in the acquisition of knowledge-based services. The acquisition workforce shrunk by 3,370 personnel during 2001 to 2008 (GAO, 2009a), however obligations for knowledge-based services in DoD increased from \$28.3 billion to \$45.2 billion between FY2005 and FY2011 (DPAP, 2012; GAO, 2007a). Fragmented buying involving more than 80% of the buying offices in the acquisition of knowledge-based services may prevent the USAF from capturing tacit knowledge. When we compare this with for-profit sector interview's data, we found that all four organizations operating from multiple locations are using centralized buying offices. This tacit knowledge not only will help to achieve efficiencies while contracting in the future, but will also help to understand the deliverables and administering the contracts more efficiently.

Socioeconomic development and providing an opportunity to small businesses in contracting is mandated by the government (FAR, 2013c). In FY2010, the DoD set a goal of 22.28% of the obligated dollars for small business

set-aside and achieved 20.94%. The USAF fell short of the DoD's goal and achievement with only 14.4% of the obligated dollars going to small businesses (U.S. Air Force, 2011). The set-aside requirement highlights the additional legal mandates such as the 'Rule of Two' faced by government buying offices to meet the socioeconomic programs (SBA, 2012). As per the interview data, none of the for-profit sector buying offices faced this constraint in implementing the best practices for cost savings. However, for the USAF, consolidation of contracts, that were set-aside for small business, may result in bundling which could lead to additional requirements (FAR, 2012b). Bundling refers to the consolidation of two or more requirements previously performed under separate smaller contracts that is likely to preclude a contract being awarded to small business (FAR, 2013b). Cost savings through bundling could affect the government's goal for small business set-aside. Therefore it is becoming difficult for the USAF to balance between contract consolidation and meeting its socioeconomic requirements.

In our five selected PSCs, 748 (34.62%) original contracts out of 2,160 were sole source arrangements. Table 9 depicts the breakdown of single and sole source contracts in the selected five categories. Two hundred and fifty contracts were not available for competition, and 498 contracts were not competed. Sole-source arrangements in 23% of the USAF knowledge-based contracts present an opportunity for supplier development and cost savings by taking extraordinary measures to infuse competition.

Finally, we found that the USAF used a number of contract types while procuring knowledge-based services. When we analyzed 2,160 original contracts in the selected five PSCs by contract type, we found that there were 987 fixed-price contracts, 868 cost-reimbursement types, 275 T&M contracts, and the remaining 30 were LH contracts. Our analysis of the for-profit sector interviews also reflected that four out of seven respondents preferred the use of fixed-price contracts where the performance risk lay more with the contractor.

Using performance-based contracts in place of T&M and LH contracts presents a significant opportunity for savings.

RQ 5. What are the different outcomes/deliverables of contracted knowledge-based services (e.g., technical reports, research, staff support labor, education, training, analysis, advice, briefings, white papers)?

To analyze the outcomes/deliverables of contracted knowledge-based services, we took a sample of 100 contracts from the five selected categories of knowledge-based services. The selected 100 contracts displayed a huge variety of deliverables. Each contract provided different types of deliverables. Important deliverables with respect to the selected 100 contracts are as follows:

1. To render technical support services including studies, analyses, and evaluation of engineering/technical issues, ground and flight-test data packages, in-plant technical support, weapon system engineering and technical support, and undertaking system engineering and integration, etc.
2. To provide advisory services such as hardware/software solutions, qualification testing of software, investigation and resolution of anomalies, arrangement of guidance conferences for engineering data, and qualified and experienced technical advisors, etc.
3. To develop and provide a variety of plans, including program management plans, system engineering management plans, logistics support plans, quality control plans, configuration management plans, integrated master plans, systems engineering management plans, test and evaluation program plan, risk management plans, supply support plans, software development plans, etc.
4. To prepare and furnish reports, papers, and documents, such as life-cycle management documents, technical reports, updates to technical orders, status reports, presentations, briefings, information papers, graphics, analyses, and other documentation.

5. To provide program management/contract support services, such as preparation of acquisition strategy and assistance in source selection.
6. To assist and provide IT-related services, such as data rights, files in an appropriate format, delivery and testing of software solutions, etc.
7. To supply logistics support services, such as fuels management, cargo movement, cargo movement travel and training, communication, medical, etc.

RQs 6 & 7. Of the different outcomes of knowledge-based services, what are the major cost drivers (e.g., time, labor rates, skills, travel, etc.) of each by type? How are costs minimized? Can those cost drivers be better managed to increase efficiency without compromising effectiveness? If so, how?

To identify cost drivers, we undertook a three-prong approach, starting with the literature review, followed by a quantitative analysis, and finishing with the qualitative analysis. From the interviews, we were able to identify some outcomes, cost drivers, and cost minimization techniques. Table 16 depicts the important cost drivers as identified by the for-profit sector interviewees.

Table 16. Interview Outcomes, Cost Drivers, and Cost Minimizers

Private Sector Interviewee	Outcome	Cost Driver	Minimization
Assisted Living Services Company	Sales enhancement, Resident satisfaction	Legal fee variation by location	Apply TCO
Domestic and International Relocation Company	Serviceable actions	Labor hours	Competitive bidding
Petroleum Management Company	Piping & Instrumentation Diagram, Alignment Sheets for pipelines	Labor hours	Competitive bidding
Food Production and Distribution Company	Technical report, research, staff support labor, education, training, analysis, expertise, advice, presentations, white paper	Labor hours driven by expertise level of personnel	Well defined requirement in SOW outlining deliverables, require detailed bids, metrics to ensure you are getting what you ask for
Global Engineering Company	Scope defined in the contract	Level of complexity	Competitive bidding, Well defined SOW, Distinction
Acquisition Learning Solutions Company	Education, training, expertise, advice, technical reports	Travel, Keeping training materials up-to-date	Forecasting and managing personnel and training material
Global Payment Processing Company	Technical reports, research, staff support, education, training, analysis, expertise, advice, presentation, white paper	Labor rates, Lead-time, Timing, Competition	Proper planning, Accurate SOW, Review historical usage, Competitive bidding
Public Sector Interviewee			
Department of Energy	Technical reports, research, staff support, education, training, analysis, expertise, advice, presentation, white paper	Time, Need, Duration, Risk, Urgency, Complexity, Criticality	Having the right management
NPS Faculty	Technical reports, research, staff support, education, training, analysis, expertise, advice, presentation, white paper	Labor hours, Labor rates, Position descriptions of personnel	Accurately describe needs, Competitive bidding, Sound analysis of proposals
Department of the Army # 1	Technical reports, research, staff support, education, training, analysis, expertise, advice, presentation, white paper	Unable to identify due to lack of personnel and expertise	Proper Lead-time allows for defined requirement, Competitive Bidding
Department of the Army # 2	Technical reports, research, staff support, education, training, analysis, expertise, advice, presentation, white paper, power point presentations, cost analysis reports	Labor rates	Consolidate requirements, demand management

The USAF FY2010 spend data and the content analysis of the selected 100 contracts highlights travel, security clearances, software data rights, and the construction of a test facility as some of the cost drivers. Additionally, for-profit and not-for-profit data analysis revealed skill level and labor hours/rates as major cost drivers. To minimize travel costs, the USAF should use demand management to determine whether travel is necessary or can be substituted by

another means of communication. To minimize the security clearance costs, the USAF should ensure that only personnel that need to have clearances obtain them. Although data rights have large upfront costs, it is important for the USAF to decide early in the development phase whether it requires the data rights from the supplier. This will eliminate potential future costs associated by not owning the data rights and can allow for competitive bidding in future contracts often resulting in lower costs. Although there was only one instance of facility construction out of the 100 contracts analyzed, it is important for the USAF to determine alternate solutions/existing locations instead of constructing a new facility. The best way to minimize costs for skill level, labor rates, and labor hours is for the USAF to conduct demand management, ensure the requirement is well defined, and conduct market research.

Based on the analysis of interviews and spend data, our team identified six major cost drivers. Details that include ways to minimize the cost drivers and increase efficiency without compromising effectiveness are enumerated in the following paragraphs:

1. Lack of Standardized Taxonomy for the Deliverables: The content analysis of our selected 100 contracts revealed a variety of deliverables for knowledge-based services. At present, there is no standard taxonomy for the categorization of these deliverables. During the content analysis, we observed that the absence of the categorization of deliverables had a negative impact on the quality of the PWS. It is essential to have clarity of thought for the development of a comprehensive PWS. In the absence of a standard taxonomy of deliverables, the user and the contracting officer may find it difficult to develop a good PWS. Non-availability of clear deliverables especially in cost reimbursement, T&M, and LH type of contracts, can result in major cost overruns. For example, in most of the knowledge-based advisory and assistance service contracts from our selected PSCs, we found that the contract

required a person to be physically present at the site. Whereas, in contract number FA920007D0045, we found that the advisory and assistance service was contracted in two parts; limited physical on-site support as well as support provided via e-mail / phone.

Additionally, in contract number FA820706D0001, we found that the advisory and assistance services were conducted via e-mail / phone. Since our research identified labor hours as a major cost driver in the acquisition of knowledge-based services, it is imperative to identify the exact deliverable that is contracted so as to minimize the labor hours. In order to mitigate the effect of this cost driver, the DoD needs to develop a taxonomy for the deliverables in order to bring clarity and standardization. Our proposed taxonomy (Table 11) divides the deliverables between tangible and intangible services which helps to determine the extent of customer interaction in service production. A standard taxonomy could save money by allowing the USAF to contract for deliverables, thereby reducing labor hours and travel costs. Additional cost savings can be reaped by contracting in a region where labor costs are cheaper.

2. Ineffective Demand management: For-profit sector interviews identified demand management as one of the best practices for cost savings. The USAF needs to look at the commodities and services they are consuming to determine what they can reduce, eliminate, or substitute. To achieve this, the USAF needs to change the culture regarding how it views demand management throughout the organization. The leadership at every level must engage and support an atmosphere of cost control, let go of the perceptions that savings may cause budget decreases, and relinquish control of contracts that could be sourced at a DoD-wide level, reduced, substituted, or eliminated. For example, in the USAF knowledge-based service spend, the Director of the USAF knowledge-based

services Council said, “In some areas, 97% of the money is spent at the end of the fiscal year” (personal communication, April, 22, 2013). This raises a question for the legitimacy of the demand.

Additionally, we identified travel cost as one of the cost drivers in quantitative analysis. To minimize the travel costs, the USAF should use demand management to determine whether travel is necessary or can be substituted by another means of communication.

3. **Excessive Cost of Outsourcing:** Another way to achieve efficiencies is by looking at the benefits of either insourcing or outsourcing. POGO conducted a cost benefit analysis in 2011 between federal and contract employees in over 35 employment categories and concluded that a contract employee earns 1.83 times more in total compensation as opposed to a federal employee in 33 of the 35 categories (2013). Table 14 depicts knowledge-based services that POGO analyzed that were closely associated with the five PSCs we analyzed in this research. Out of these knowledge-based services, a contractor earns on average 1.76 times more than a federal employee (POGO, 2013). The USAF should compare the price of a federal employee vis-à-vis the cost of outsourcing and managing that employee because the federal employee can often be more flexible and require less oversight even if the cost of outsourcing may cost less. The efficient use of a make or buy decision in conjunction with a spend analysis can bring efficiency in the USAF strategic sourcing.
4. **Non-Consolidation of Contracts:** The for-profit sector identified consolidation of the contracts as one of the best practices. Most of the for-profit sector organizations, operating at multiple locations, aim to have a centralized procurement office. The center-led procurement office allows the management of the for-profit sector organization to better control manpower and effectively assign a

contract to the most qualified individual. Although the USAF has some constraints in consolidating knowledge-based service contracts, there are opportunities for the USAF to realize additional cost savings. The content analysis of our selected 100 knowledge-based service contracts revealed that the USAF is acquiring similar knowledge-based services from different buying offices. By consolidating the acquisition of knowledge-based services of geographically dispersed buying offices, the USAF can achieve transactional cost savings. Additionally, consolidating these service contracts to a region where labor rates are cheaper and the deliverable does not require physical presence of labor may result in additional savings. Contract consolidation can also help decrease the effects of a shortage in the acquisition workforce by eliminating contract staff redundancies in contract management.

5. **Lack of Supplier Development for Knowledge-Based Services:** The content analysis of the 2160 knowledge-based service contracts in the selected five categories revealed that 498 contracts were “not competed.” We identified lack of competition in 23.05% (498) contracts as one of the major cost drivers for knowledge-based services which highlights a possible opportunity for supplier development and cost savings. The United States Navy used the supplier development concept in the case of its Littoral Combat Ship to develop an additional supplier to increase competition and drive down costs (CRS, 2010). Some of the contracts involving software stay in the category of “not available for competition” due to non-availability of unlimited data rights with the government. The USAF should consider purchasing software data rights at the onset of the contract to decrease sole-source scenarios and allow for competitive bidding. Once the USAF awards a sole source contract, there is a good chance that all follow-on contracts will also be sole sourced to

the same firm without being competed. In order to alleviate the effect of limited supplier base on these specific knowledge-based services, the USAF needs to conduct a thorough spend analysis/market research and target potential sources for supplier development of such sole-sourced contracts.

6. Lack of Knowledge Management System: The combination of the spend data and content analysis of the selected 100 contracts revealed that a number of knowledge-based services were outsourced. Repeated outsourcing of the knowledge-based services by the USAF allows the contractors to reap the benefits achieved through the accumulation of tacit knowledge and learning curves. We identified the lack of an overarching knowledge management system in the USAF to retain tacit knowledge as one of the cost drivers. The USAF should attempt to capture its tacit knowledge by using a technique similar to the Center for Army Lessons Learned that continually conducts interviews, records real-time videos, processes real-time images, and transforms them into useful knowledge broadcasted for use by all personnel. Using an external source like CALL would allow the USAF to develop a continuously updated system and document its tacit knowledge without effecting day-to-day operations. Additionally, the system could act as a venue for posting previously purchased deliverables (reports, analyses, research, etc.) so that buyers do not buy the same thing twice simply due to ignorance of other contracts. A recent article suggests that sharing data, such as analysis, opens up information to some people who would not normally have access and allows others to maintain a better work-life balance by allowing remote access (Marks, 2013).
7. Lack of Quality Spend Data: Most of the for-profit sector interviewees rely on spend analysis to efficiently undertake strategic

sourcing. Decisions based on accurate figures affect the overall performance of an organization. Non-availability of a good quality spend data can adversely affect the outcome of the spend analysis. The quantitative analysis of the USAF spend data for FY2010 revealed that presently FPDS–NG records all obligations in a contract under a single PSC; however, most of the contracts have more than one CLIN, and often these CLINs belong to different PSCs. Moreover, the availability of a PSC under the “others” heading, within each category of the PSC manual, also affects the proper recording of spend data. Erroneous data provides the misrepresentation of the actual spend and may lead the decision-makers to arrive at a wrong conclusion. Because strategic sourcing starts and ends with spend analysis, inadequate spend data inhibits the effective use of the for-profit sector best practices and considered as a cost driver. By adopting a system that presents accurate data, the USAF will be able to exploit the spend analysis to its full potential in its strategic sourcing.

Cost drivers can be better managed to increase efficiency without compromising effectiveness by standardizing a taxonomy for the deliverables, managing demand, consolidating contracts, developing suppliers, implementing an overarching knowledge management system, and ensuring quality spend data.

RQ 8. By applying commercial best practices and original ideas, how much cost could be saved or avoided?

Although the scope of this study did not cover the cost-benefit analysis in terms of dollars saved, the USAF can achieve cost savings/avoidance through standardizing taxonomy for the deliverables, managing demand, consolidating contracts, and developing suppliers; and by implementing an overarching knowledge management system and ensuring quality spend data. ATKearny (2003) stated that “savings in excess of 10 percent of analyzed spend are not

uncommon.” This 10% savings results from analyzing the spend data and applying demand management levers such as eliminating demand, reducing quantity, simplifying specifications, reducing frequency, encouraging substitution, imposing tighter process and tracking, increasing cost awareness, and tightening policies (ATKearny, 2003). Additionally, market research, reverse auctioning, and e-sourcing all promote competitive bidding, which can often produce cost savings. In 2008, the USAF realized a \$395,000 savings by utilizing reverse auctioning to purchase and install 29 backup generators (McCree, 2008). Use of preferred vendors in long-term contracts can often reduce costs by spreading the overhead costs over multiple years and often providing volume rebates to the customer. The Navy is currently developing a Superior Supplier Incentive Program (SSIP) for the DoD, with the intent to recognize contractors by granting them Superior Supplier Status (SSS), using baseline data from Contractor Performance Assessment Reporting System (CPARS) (Kendall, 2013). The suppliers can achieve SSS status by focusing on cost, schedule, performance, quality, and business relations and could receive more favorable contract terms and conditions in contracts (Kendall, 2013).

E. SUMMARY

In this chapter, we conducted a quantitative analysis of the FY2010 USAF spend data and a qualitative analysis of 11 interviews conducted with the for-profit and not-for-profit sectors. Our analysis, along with our literature review, provided the information needed to answer our research questions. In the next chapter, we provide discussions and implications, offer recommendations for the USAF, study the limitations, and suggest areas for further research.

V. CONCLUSION AND RECOMMENDATIONS

A. INTRODUCTION

Obligations on the acquisition of services have doubled between FY2001 and FY2008, from \$92 billion to \$200 billion (GAO, 2009b). Knowledge-based services constitute an increasing portion of the total services acquired by the DoD. Between FY2005 and FY2011, the DoD increased the use of knowledge-based services from \$28.3 billion to \$45.2 billion (DPAP, 2012; GAO, 2007a). However, the DoD is currently unable to determine how much savings can be attained in this area by using the for-profit sector best practices for acquiring such services. The purpose of this research was to explore whether and how the USAF can improve efficiency in sourcing knowledge-based services by instituting commercial best practices in strategic sourcing. The research tried to bridge a literature gap, identify best practices, and apply them in the context of the USAF. During the research, our team sought to address the following eight research questions:

Research Question 1: What are the relevant tenets of strategic sourcing?

Research Question 2: What are commercial best practices in sourcing knowledge-based services?

Research Question 3: What are the constraints, if any, of applying the commercial best practices in the USAF context?

Research Question 4: What are the different types of knowledge-based services being procured? How much money is spent on these services, with how many different contractors, from how many different buying offices, and through how many different contract actions? How many are with small businesses? How many are sole source? What is the composition by contract type?

Research Question 5: What are the different outcomes/deliverables of contracted knowledge-based services (e.g., technical reports, research, staff support labor, education, training, analysis, advice, briefings, white papers)?

Research Question 6: Of the different outcomes of knowledge-based services, what are the major cost drivers (e.g., time, labor rates, skills, travel) of each by type? How are costs minimized?

Research Question 7: Can those cost drivers be better managed to increase efficiency without compromising effectiveness? If so, how?

Research Question 8: By applying commercial best practices and original ideas, how much cost could be saved or avoided?

These questions were addressed using a three-pronged approach (i.e., a study of already available literature on the subject, a spend analysis of USAF FY2010 data, and undertaking interviews from both for-profit and not-for-profit sectors). We were able to identify the relevant tenets of strategic sourcing and commercial best practices in sourcing knowledge-based services through literature review and qualitative interviews. Moreover, to study the modalities of applying these best practices on the USAF, we were able to extract the relevant records from FPDS–NG FY2010 spend data and undertook detailed analysis of 100 knowledge-based FY2010 USAF sample contracts. The comparison of the for-profit sector best practices and extracts from the USAF spend data helped us to identify the cost drivers and the theoretical options to manage these cost drivers.

B. DISCUSSION AND IMPLICATIONS

In order to implement best practices for use by the USAF and to eliminate inefficiencies and redundancies in the acquisition of knowledge-based services, we analyzed the differences in the environments in which the USAF and the for-profit sector operate. There are certain limitations within the USAF that act as barriers in the complete implementation of the commercial best practices in its contracting operations. Before implementing any set of best practices in the sourcing of the USAF knowledge-based services contracting, it is prudent to discuss implications of the commercial sector best practices in light of these barriers.

1. **Security Implications:** The for-profit sector organizations primarily focus on increasing their revenues and return on investments by applying best practices such as strategic sourcing, leveraging of global suppliers, and internal resources and processes. Although the USAF can also achieve cost savings by applying some best practices, there are certain issues relating to security which prevent the USAF from adopting these measures. Legal mandates, such as The Buy American Act/Berry Amendment and issues relating to security clearances are a few barriers that impede the USAF in implementing global sourcing to its true potential.
2. **Organizational Size and Diversity:** The USAF is much larger organization when compared with the for-profit sector organizations with respect to geographical diversity and the amount of dollars it spends annually. The for-profit sector organizations use demand management to look at the commodities and services they are consuming to determine what they can reduce, eliminate, or substitute. Although the USAF uses demand management to realize cost savings in some areas, its size, geographic dispersion, lack of leadership involvement, organizational culture, decentralized organization structure, lack of goals, measurement, and accountability for cost performance outside of weapon systems make it difficult to implement demand management to its full potential.
3. **Shortage in Acquisition Workforce:** Over the last decade, the DoD and USAF have increased the use of knowledge-based service contracts while facing a shortage in the acquisition workforce to manage the increasing workload efficiently. Although the USAF is saving money and filling the present capability gaps by outsourcing knowledge-based services, it is finding it difficult to capture the valuable tacit knowledge. A future shortage of knowledge workers

could cause the USAF to spend even more money on outsourcing knowledge-based services or retaining current knowledge workers. The present hiring freeze due to sequestration can further aggravate this problem. If the present scenario persists, the USAF may find it even more difficult to retain the tacit knowledge and may struggle to perform on par with its for-profit sector counterparts. The shortage of workforce, increased workload, huge amount of transactions made annually, and non-availability of an accountability tool use to penalize individuals for inadvertently spoiling FPDS–NG data affects the quality of spend data. Spend analysis is the cornerstone of strategic sourcing, and the non-availability of reliable spend data can handicap the USAF in implementing this best practice.

4. **Legal Mandates:** The for-profit sector utilizes preferred partners when they contract for services. These long-term relationships with qualified vendors help them in achieving substantial cost savings. Owing to the legal requirements, such as the FAR and CICA, the USAF is to promote full and open competition, which can sometime handicap the development of strategic partnerships with suppliers. Similarly, the requirement of other legal mandates such as the Buy American Act/Berry Amendment may prevent the USAF from global partnerships, which is against the norms of the for-profit sector organizations.
5. **Socioeconomic Programs:** The data gathered through interviews showed that the for-profit sector companies did not face any handicap in implementing the best practices to achieve its goals of cost savings. However, the USAF, being a government not-for-profit organization, is bound to fulfill certain legal mandates, such as the 'Rule of Two', to meet the socioeconomic programs (SBA, 2012). Contract consolidation is one of the best practices from the for-profit sector, but socioeconomic set-asides and legal mandates are

common barriers for the USAF in implementing contract consolidation. The USAF is using contract consolidation to eliminate redundancies caused by multiple contracts for the same item and achieves cost efficiencies by using contract instruments such as BPAs and IDIQ contracts. There is an opportunity for the USAF to consolidate its contracts and avoid additional administrative and transactional costs. Consolidation of contracts can also help in cost savings through better prices and geographical relocations. The government cannot deny the importance of using socioeconomic programs and legal mandates; however, they do hinder the implementation of the best practices in their true spirit.

6. **Lack of Common Goals and Tangible Measures of Performance:** The major goal of for-profit sector organizations is to enhance value for their shareholders by increasing revenues, return on investments, and return on assets. Members of a for-profit sector organization focus on achieving this goal, and management uses tangible measures to assess the performance of each individual. However, in the USAF, there is sometimes a slight contrast in the objectives of stakeholders, and there is no tangible measure to gauge their inefficiencies. For instance, the requirement community's objectives are at times different from those of the acquisitions workforce. The difference in objectives affects the overall goal of the organization. The effects of these irregularities varies from cost inefficiencies to imprecise PWSs/SOWs.

C. RECOMMENDATIONS

Recommendation 1: The DoD needs to develop a standard taxonomy for the deliverables to effectively mention in the requirements documents.

The OUSD (2010b) memorandum *Taxonomy for the Acquisition of Services* clearly identifies all the services under 33 portfolios (in six portfolio

groups). Before the issuance of this memorandum in 2010, there was no standard taxonomy for the different types of services. The introduction of this memorandum brought significant standardization among different groups of services. However, currently there is no standard taxonomy for the deliverables contracted under the different portfolio groups or PSCs. There is a huge variety of deliverables contracted when acquiring services, especially for the knowledge-based services. For the development of a PWS, clarity of thought is essential. In the absence of a standard taxonomy of deliverables, the user and the contracting officer may find it difficult to develop a good PWS. The DoD needs to develop a taxonomy for the deliverables in order to bring clarity and standardization. Moreover, the development of taxonomy will also give an opportunity for cost savings by purchasing deliverables of knowledge-based services instead of labor hours for undefined requirements. Table 11 depicts a proposed taxonomy that breaks down a sample of deliverables between intangible and tangible services applied to personnel or possessions.

Recommendation 2: The USAF should attempt to develop expertise by consolidating its contracts across different buying offices

The for-profit sector identified consolidation of the contracts as one of the best practices. Most of the for-profit sector organizations, operating at multiple locations, aim to have a centralized contracting office. This allows the for-profit sector organizations to keep their contracting manpower at one location and assign a contract to the most qualified individual. However, the scenario is quite different for the USAF due to a number of factors, such as the huge amount of contracting involved, socioeconomic set-aside contracts, customers wanting to retain control over their contracts, dissimilar services, fiscal law (time, purpose, amount), and oversight. Despite these constraints, there is a huge opportunity for the USAF to consolidate its requirements geographically or by type of service contracted. Apart from transactional cost savings, consolidation of two knowledge-based contracts to a single geographical location, where the cost of labor is comparatively less, could result in substantial savings.

Recommendation 3: The USAF needs to broaden the scope of demand management in conjunction with their spend analysis.

Although a spend analysis can reduce costs immediately by consolidating contracts and eliminating redundancies, demand management goes one step further and looks at the consumption. The USAF needs to look at the services it is consuming to determine what it can reduce, eliminate, or substitute. To achieve this, the USAF needs to change the culture about how it views demand management throughout the organization. Leadership is the most important aspect for success of any kind of change effort. The leadership at every level must engage and support an atmosphere of cost control, let go of the perceptions that savings may cause budget decreases, and relinquish control of contracts that could be sourced at a DoD-wide level, reduced, substituted, or eliminated. Another way to achieve efficiencies through demand management is by looking at the benefits of either insourcing or outsourcing. The efficient use of demand management at every level in conjunction with spend analysis can bring efficiency in the USAF sourcing.

Recommendation 4: The USAF should look into the possibilities of supplier development for “not competed” contracts to ensure that follow-on knowledge-based services support can be competed.

Out of the 748 sole-sourced contracts, 250 contracts were not available for competition. Once the USAF awards a contract as sole source, it is likely that all follow-on contracts will also go to the same firm without being competed. This presents a possible opportunity for supplier development, which will result in competition, and cost savings for all the follow-on contracts. The USAF needs to include a means of evaluating the other offeror’s ability to perform a contract and the possibility of supplier development for “not available for competition” contracts to ensure that follow-on knowledge-based services support can be competed.

Recommendation 5: The USAF should look into the possibility of making CORs a permanent position instead of a secondary job.

Presenting clearly defined performance metrics up front to a supplier can reduce the risk of substandard performance. The USAF already uses metrics such as performance evaluations and quality assurance surveillance plans to track knowledge-based services that are monitored by CORs; however, lack of training, time, technical expertise, and oversight often allows contractors to complete substandard services. The USAF should consider making CORs a permanent position instead of a secondary job so that they can dedicate their efforts solely to conducting evaluations and providing feedback to the contractor in order to eliminate the waste of resources due to incomplete or substandard work. Although these permanent COR positions may increase personnel costs, properly implemented performance metrics can lead to increased efficiencies while maintaining effectiveness.

Recommendation 6: The USAF should look into the possibilities of retaining tacit knowledge.

The analysis of knowledge-based services revealed that a number of services have been outsourced and are being procured repeatedly by the USAF. In this manner, the USAF is spending money on the same service continuously. No organic capability has been prepared or retained in this regard, which creates multiple issues. First, when the USAF outsources the service, the contractor reaps the benefits through learning curves and retention of tacit knowledge. Second, the USAF is unable to define its requirements correctly and may no longer have the organic capability to check the quality of the service. The USAF should attempt to capture its tacit knowledge by using a technique similar to the CALL that continually conducts interviews, records real-time videos, processes real-time images, and transforms them into useful knowledge broadcasted for use by all personnel.

Recommendation 7: The DoD should record every CLIN in FPDS–NG by its individual PSC.

Presently, FPDS–NG records all obligations in a contract under a single PSC; however, most of the contracts have more than one CLIN, and often these CLINs belong to different PSCs. The for-profit sector highlights spend analysis as one of the best practices to achieve efficiency. The same practice is also being done in all components of the DoD; however, once a PSC is selected for the purpose of spend analysis, it provides a misleading number in most of cases. This is due to the presence of different CLINs under a single contract PSC. To undertake the spend analysis efficiently; all obligations need to be recorded under their respective PSCs. However, if the government lacks the funds to upgrade the FPDS-NG, the next best alternative would be to add fields in the existing contract action report. This will allow the contracting officer to break down the obligation of a contract and precisely report the spend on a particular PSC.

Recommendation 8: The DoD should add a field for the type of deliverable in the FPDS–NG data.

Presently, there is no taxonomy for the contracted deliverables and hence the FPDS–NG record does not depict the nature of service contracted. The DoD needs to develop and implement a taxonomy for the deliverables and subsequently add an additional column in the FPDS-NG program for recording deliverables and undertaking spend analysis. For example, Table 17 suggests a codification of the deliverables for entering data as per our suggested model in Table 11.

Table 17. Suggested Codification for the Deliverables

Type of Deliverable	Suggested Codes for FPDS-NG
People Processing	1
Possession Processing	2
Mental Stimulus Processing	3
Information Processing	4

Recommendation 9: The DoD should eliminate the “other” services and product PSC category from the PSC manual.

In order to have a clear visibility of the obligations by PSC, it is essential to record data properly. Availability of a PSC under the “others” heading within each category of the PSC manual is a wrong but convenient way to record an obligation. Elimination of the “other” PSC headings will leave the data recorders with no option but to find an exact PSC to which the obligations belong.

D. STUDY LIMITATIONS

A number of limitations and areas restricted the in-depth analysis of this study. These limitations included a lack of clarity in the data, limited responses to interviews solicited, and administrative issues. We enumerated some of the pertinent limitations that affected the outcome of this study below:

1. In our research, we used a small sample from a large population. We handled 100 contracts for an in-depth analysis of cost drivers and deliverables as compared to 6,677 original contracts in the category of knowledge-based services. Additionally, we used a convenience sample rather than using a random sample. We selected 20 contracts in each of the five selected categories depending on the maximum amount of spend. Such a sample is bound to produce some biases, and this presented some figures that may not convey the actual meanings.
2. This research was based on the spend data provided by FPDS–NG (2010). A careful analysis of the data presented a number of shortcomings. For example, due to ambiguity in the PSC manual, a number of contracts were placed in the “others” category, which equates to miscellaneous expenditure and does not present the exact expenditure in a given category. Another shortcoming was the presence of a number of CLINs in a single contract. Most of the CLINs belonged to a different PSC; however, the FPDS–NG data

accounts for them under a single PSC with the maximum amount of spend. In addition, some of the contracts were recorded under the wrong PSC, and without opening the contract or SOW, the exact purpose of the spend could not be determined. Hence, the spend analysis conducted with this sort of data contains some inherent flaws.

3. We developed a comprehensive research questionnaire for each of the for-profit and not-for-profit sectors. It was a cumbersome job to identify the for-profit sector interviewee, who was involved in the acquisition of services, representing one of the selected five PSCs. We believe some respondents avoided the interview due to a lengthy questionnaire. Although we were able to get an 11% response rate, it was far less than expected. In addition, few of the questions were aimed at the organizational structure or the financial status of the firm; in such cases, the respondents were reluctant to tell the exact figures regarding sensitive or vulnerable areas. In addition, some of the questions were perception based, and it was the self-reported perceptions of the contracting individuals, which introduces bias.
4. Our analysis was based on the USAF spend for FY2010. Despite a number of attempts, we were unable to interview a single USAF contracting employee who was involved in the acquisition of knowledge-based services. Although we were able to contact two individuals who worked in the contracting field, they were unable to provide specific insight to the research questions.
5. Our team lost months waiting for the IRB approval due to administrative issues at NPS, which limited our time to conduct interviews and further analysis.

E. RECOMMENDATIONS FOR FUTURE RESEARCH

This study focused primarily on the effectiveness gained through implementing commercial sector best practices in the acquisition of knowledge-based services. However, during the course of the study, we realized a number of places where the USAF may achieve savings.

1. We realized that the USAF has multiple buying offices at the same location, and at times all contracting for the same type of service. Contract consolidation came out to be one of the for-profit sector best practices. This best practice could eliminate redundancies and develop expertise in the acquisition workforce. Although the USAF does not presently account for administrative or transactional costs, a study to find the transactional cost savings involved in consolidation of the contracts should be undertaken in future. Transaction costs in the government are likely to be substantial; thus, mitigating them could reduce total costs of ownership.
2. The presence of a standard taxonomy has the ability to streamline a complicated system. The OUSD (2010b) memorandum *Taxonomy for the Acquisition of Services*, identified all the services in six categories as per the PSC. However, there is no taxonomy on the deliverables while acquiring services which impacts the clear and precise analysis of the true outcome being purchased. It is essential for the DoD to develop a taxonomy for the deliverables in order to unveil true cost drivers and appropriate sourcing strategies to mitigate the cost drivers. A study may be undertaken in the future to develop taxonomy of deliverables for acquiring knowledge-based services.
3. Our study focused on five types of knowledge-based services in the context of the USAF. Typically, the USAF has certain technological differences as compared to the other components of the DoD. A

similar study for other components of the DoD may be undertaken to find additional shortcomings in the DoD acquisition process.

F. SUMMARY

In conclusion, this study examined the efficacy of sourcing knowledge-based services in the USAF context while applying commercial sector best practices. Both quantitative and qualitative analyses were undertaken in order to find inefficiencies in the USAF sourcing and finding for-profit sector best practices of strategic sourcing. In brief, we found seven for-profit sector best practices that could bring savings to USAF if adopted in true spirit. Some of the practices are difficult to implement due to socioeconomic factors and legal mandates; however, the USAF can implement them with fruitful results. Based on the results of our quantitative and qualitative analyses, during this challenging time after the materialization of sequestration, the DoD needs to enhance the use of some of the commercial sector best practices in its acquisition.

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APPENDIX A. FOR-PROFIT SECTOR INTERVIEW QUESTIONNAIRE

1. What are the different types of knowledge-based services being procured?
2. How is your organization structured to manage the procurement of knowledge-based services?
3. How many people manage your organization's procurement of knowledge-based services?
4. Does your organization specifically track the spend on knowledge-based services?
5. How do you control spending on knowledge-based services? Are there policies that establish who is authorized to request or contract for these services? Are there dollar-value based approval thresholds?
6. What other strategies do you use to mitigate demand for these services (e.g., demand management)?
7. Do you maximize competition when procuring these services? Do you use sole-source contracts (i.e., not competed)?
8. Do you use "should-cost" analysis?
9. Do you use total cost analysis or strategic cost management?
10. Knowledge-based services can be sensitive requirements since certain internal customers have strong ties to certain companies (e.g., consultants). How do you overcome or manage this?
11. What metrics do you use to track the efficiency of the procurement of knowledge-based services?
12. Do you evaluate a supplier's record of or ability to reduce costs when evaluating suppliers during the source selection/tender process?

13. What incentives do you provide to suppliers of knowledge-based services to perform very well?
14. What are your sourcing strategies for acquiring each of the different types of knowledge-based services?
15. What is your preferred methodology regarding sourcing tacit / explicit knowledge-based services vis-à-vis insourcing / outsourcing? Do you compare the cost of outsourcing/contracting vs. hiring and performing the services in-house prior to deciding to contract for the services?
16. Are there any processes / IT systems in your organization to preserve / transfer the outcome of those knowledge-based services that are tacit?
17. If your organization is spread across many locations and/or business units, how do you prevent multiple contracts for the same types of knowledge-based services?
18. Do you have local, regional, or one central buying office to purchase knowledge-based services?
19. If you prefer regional buying office, than what is your policy for covering different regions?
20. In your organization, do you follow any peculiarly defined model/checklist while sourcing knowledge-based services?
21. While contracting for knowledge-based services, what are the different outcomes/deliverables that your organization aims to achieve (e.g., technical report, research, staff support labor, education, training, analysis, expertise, advice, presentations, white paper, etc.)?
22. Of the different outcomes of knowledge-based services, what are the major cost drivers of each by type?
23. Do you think these cost drivers can be minimized?
24. If so, how?

25. If yes, what are the policy hurdles in meeting the objective of cost minimization?
26. From where do you discover the latest cost savings strategies/ideas (e.g., hire the best talent, attend conferences, trade publications, consultants, others)?
27. Does your organization engage in supplier development for “bottleneck / strategic” knowledge-based services?
28. Does your organization use electronic reverse auctions to procure knowledge-based services?
29. What is your strategy regarding strategic partnership with your suppliers for knowledge-based services?
30. In your organization, what is a typical duration for awarding a services contract?
31. To achieve efficiency in sourcing knowledge-based services, what strategies are being practiced in your organization (e.g., spend analysis, demand management, contract consolidation, reverse auctioning)?
32. What are the constraints, if any, of applying the best practices of strategic sourcing in your organization while acquiring knowledge-based services?
33. What is the spend ratio in your organization for acquiring services vis-à-vis supplies?
34. Out of these services what is the approximate percentage of knowledge-based services?
35. What is your preferred number of contractors for any specific services contract?
36. For the purpose of awarding contracts, DoD uses either Fixed price, labor-hour, or Cost re-imbursement contracts. What is the preferred type of contract for knowledge-based services used by your

organization? Do you essentially buy time (labor-hour) or do you specify deliverables?

37. Do you have any plans for improving your sourcing strategy to enhance efficiency?

APPENDIX B. NOT-FOR-PROFIT SECTOR INTERVIEW QUESTIONNAIRE

1. How do you categorize different types of knowledge-based services? Why do you categorize them this way?
2. How is your organization structured to manage the procurement of knowledge-based services?
3. Does your organization specifically track the spend on knowledge-based services?
4. How many people manage your organization's procurement of knowledge-based services?
5. How do you control spending on knowledge-based services? Are there policies that establish who is authorized to request or contract for these services? Are there dollar-value based approval thresholds?
6. What other strategies do you use to mitigate demand for these services (e.g., demand management)?
7. Do you use "should-cost" analysis?
8. Do you use total costs analysis or strategic cost management?
9. What metrics do you use to track the efficiency of the procurement of knowledge-based services?
10. How much savings has your organization realized from sourcing knowledge-based services in the past year? What caused the savings?
11. What are your sourcing strategies for acquiring each of the different types of knowledge-based services?
12. What is your preferred methodology regarding sourcing tacit / explicit knowledge-based services vis-à-vis insourcing / outsourcing? Do you compare the cost of outsourcing/contracting

- vs. hiring and performing the services in-house prior to deciding to contract for the services?
13. Is there any process in your organization to preserve / transfer the outcome of those knowledge-based services that are tacit?
 14. Within your region, how do you prevent multiple contracts for the same types of knowledge-based services?
 15. In your organization, do you follow any peculiarly defined model/checklist while sourcing knowledge-based services?
 16. Is any part of your process for sourcing knowledge-based services automated?
 17. While contracting for knowledge-based services, what are the different outcomes/deliverables that your organization aims to achieve (e.g., technical report, research, staff support labor, education, training, analysis, expertise, advice, presentations, white paper, etc.)?
 18. Of the different outcomes of knowledge-based services, what are the major cost drivers of each by type?
 19. Do you think that these cost drivers can be minimized?
 20. If yes, what are the policy hurdles in meeting the objective of cost minimization?
 21. Does your organization engage in supplier development for “bottleneck / strategic” knowledge-based services?
 22. Do you use electronic reverse auctions to procure knowledge-based services?
 23. Does your organization favor strategic partnership with your suppliers for knowledge-based services?
 24. In your organization, what is a typical duration for awarding a services contract?
 25. Do you feel that Government regulations like FAR / DFAR etc., are beneficial or hurdles in achieving better strategic sourcing?

26. If you think these are hurdles, then in your opinion, what are the alternatives for achieving efficiencies while maintaining or increasing effectiveness?
27. What are the constraints, if any, of applying the commercial best practices of strategic sourcing while acquiring knowledge-based services?
28. Do you think that Government buying activities should be given the authority for rewarding suppliers for exceptional performance of a contract?

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